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THE PRACTITIONER

CONTENTS

VOL. CXXXVIII

APRIL, 1937

	PAGE
INTRODUCTION ...	337
By Sir Humphry Rolleston, Bt., G.C.V.O., K.C.B.	
THE USE AND ABUSE OF VITAMINS ...	340
By R. A. Peters, M.C., M.D., F.R.S.	
Whitley Professor of Biochemistry, University of Oxford.	
THE USE AND ABUSE OF SEDATIVES ...	347
By W. Ritchie Russell, M.D., F.R.C.P.E.	
Assistant Physician, Royal Infirmary, Edinburgh.	
THE USE AND ABUSE OF ALCOHOL ...	355
By Clifford Hoyle, M.D., M.R.C.P.	
Assistant Physician, Brompton Hospital for Consumption and Diseases of the Chest ; Examiner in Pharmacology, University of Cambridge, and the Royal College of Physicians.	
THE USE AND ABUSE OF SERUMS AND VACCINES ...	362
By Lionel E. H. Whitby, C.V.O., M.D., F.R.C.P.	
Assistant Pathologist, The Bland-Sutton Institute of Pathology, Middlesex Hospital.	
THE USE AND ABUSE OF EXTERNAL APPLICATIONS ...	369
By Harold Balme, M.D., F.R.C.S.	
Formerly Professor of Surgery, Cheeloo University, China.	
THE USE AND ABUSE OF DRUGS IN CARDIOVASCULAR CONDITIONS ...	377
By K. Douglas Wilkinson, M.D., F.R.C.P.	
Professor of Therapeutics, University of Birmingham ; Physician, General Hospital, Birmingham, and the Birmingham and Midland Free Hospital for Sick Children.	
THE USE AND ABUSE OF DRUGS IN DISORDERS OF THE BLOOD ...	388
By Charles C. Ungley, M.D., M.R.C.P.	
Assistant Physician, Royal Victoria Infirmary, Newcastle-upon-Tyne ; Leverhulme Research Scholar, Royal College of Physicians of London.	
THE USE AND ABUSE OF DRUGS IN LUNG DISEASE ...	404
By James Maxwell, M.D., F.R.C.P.	
Assistant Physician, St. Bartholomew's Hospital ; Physician, Royal Chest Hospital.	
THE USE AND ABUSE OF DRUGS IN TUBERCULOSIS ...	416
By Philip Ellman, M.D., M.R.C.P.	
Physician, the Tuberculosis and Chest Clinic, and Harts Sanatorium, County Borough of East Ham, and St. Stephen's Hospital (Rheumatic Unit) London County Council.	
THE USE AND ABUSE OF DRUGS IN KIDNEY DISEASE ...	428
By Robert Platt, M.D., F.R.C.P.	
Physician, Royal Infirmary, Sheffield.	
THE USE AND ABUSE OF DRUGS IN GASTRO-INTESTINAL DISORDERS ...	434
By T. L. Hardy, M.D., F.R.C.P.	
Physician, General Hospital, Birmingham	
THE USE AND ABUSE OF DRUGS IN DISORDERS OF THE LIVER ...	451
By Charles Newman, M.D., F.R.C.P.	
Assistant Physician, King's College Hospital, and the Belgrave Hospital for Children.	

[CONTINUED ON PAGE IV.]

CONTENTS—Continued

PAGE

THE USE AND ABUSE OF DRUGS IN THE RHEUMATIC DISEASES	458
By G. D. Kersley, M.A., M.D., M.R.C.P. <i>Physician, Royal National Hospital for Rheumatic Diseases, Bath ; Assistant Physician, Royal United Hospital, Bath.</i>	
THE USE AND ABUSE OF DRUGS IN THE ACUTE SPECIFIC FEVERS	465
By Richard Massingham, M.R.C.S., L.R.C.P. <i>Resident Medical Officer, London Fever Hospital.</i>	
THE USE AND ABUSE OF DRUGS IN SKIN DISEASES	475
By W. J. O'Donovan, M.D. <i>Physician, Skin Department, London Hospital.</i>	
THE USE AND ABUSE OF DRUGS IN MIDWIFERY	484
By Andrew M. Claye, M.D., F.R.C.S. <i>Professor of Obstetrics and Gynaecology, University of Leeds.</i>	
THE USE AND ABUSE OF ENDOCRINE PREPARATIONS	493
By Leslie Cole, M.D., F.R.C.P. <i>Honorary Physician, Addenbrooke's Hospital, Cambridge.</i>	
THE USE AND ABUSE OF DRUGS IN PSYCHOLOGICAL MEDICINE	506
By Francis Pilkington, M.A., M.B., M.R.C.P. and William Sargent, M.A., M.B., M.R.C.P. <i>Medical Officers at the Maudsley Hospital.</i>	
THE USE AND ABUSE OF DRUGS IN DISEASES OF THE EYE	511
By R. C. Davenport, M.B., F.R.C.S. <i>Surgeon, Royal London Ophthalmic Hospital (Moorfields Eye Hospital).</i>	
THE USE AND ABUSE OF DRUGS IN DISEASES OF THE EAR, NOSE AND THROAT	520
By F. C. Ormerod, M.D., F.R.C.S. <i>Assistant Surgeon, Ear and Throat Department, Westminster Hospital ; Surgeon, Golden Square Throat, Nose and Ear Hospital, and the Ear and Throat Department, Brompton Hospital.</i>	
GENERAL PRACTICE. X.—PRESCRIBING AND DISPENSING	529
By R. H. Micks, M.D., F.R.C.P.I., D.P.H. <i>Professor of Pharmacology, Royal College of Surgeons of Ireland ; Physician, Sir Patrick Dun's Hospital, Dublin.</i>	
PRACTICAL NOTES :—	
Drug Treatment of Cardiac Decomposition	543
Vitamins in Disorders of the Skin	543
Obstetrical Analgesia	544
The Treatment of Typhoid in Children	544
Sodium Evipan in Delirium Tremens	545
Peristaltic Stimulants	545
A New Antispasmodic Remedy	546
REVIEWS OF BOOKS :—	
A Manual of Radiological Diagnosis (Tchaperoff)	547
Elements of Orthopaedic Surgery (Smith)	548
A Textbook of Medicine (Emerson)	54
Vade Mecum of Medical Treatment (Sears)	54
The Facial Neuralgias (Harris)	54
Hay Fever : with special reference to treatment by intranasal ionization (Shields)	549
Contributions to Clinical Practice in Medicine and Surgery by Members of the Staff of the Southend Hospital (Edited by Hill)	549
The Extra Pharmacopœia of Martindale and Westcott	549
"THE PRACTITIONER'S" NEW BUILDING AT 5 BENTINCK STREET, W.1	550
NOTES AND PREPARATIONS :—	
British Health Resorts Association Conference at Bournemouth, 12 to 14 March, 1937	552
Folinerin (Schering, Ltd.)	552
Viteolin (Glaxo Laboratories, Ltd.)	552

THE PRACTITIONER

CONTENTS

VOL. CXXXVIII

MAY, 1937

	PAGE
THE TREATMENT OF A CASE OF HYPERTENSIVE HEART DISEASE	553
By W. T. Ritchie, O.B.E., M.D., F.R.C.P.E. Professor of Medicine and of Clinical Medicine, Edinburgh University; Physician, Royal Infirmary, Edinburgh.	
THE TREATMENT OF A CASE OF ANGINA PECTORIS	562
By John Hay, M.D., F.R.C.P., D.L. Emeritus Professor of Medicine, Liverpool University; Consulting Physician, Liverpool Royal Infirmary; Visiting Physician, City Hospital, Walton.	
THE TREATMENT OF A CASE OF THYROTOXIC HEART DISEASE	571
By Thomas F. Cotton, M.D., C.M., F.R.C.P. Physician, National Hospital for Diseases of the Heart.	
THE TREATMENT OF A CASE OF CONGENITAL HEART DISEASE	577
By Charles Harris, M.D., F.R.C.P. Physician, Children's Department, St. Bartholomew's Hospital, and the Infants' Hospital, Vincent Square.	
THE TREATMENT OF A CASE OF SYPHILITIC HEART DISEASE	585
By Geoffrey Bourne, M.D., F.R.C.P. Physician, with charge of Outpatients, and in charge of the Cardiographic Department, St. Bartholomew's Hospital.	
THE TREATMENT OF A CASE OF RHEUMATIC HEART DISEASE	594
By Basil Parsons-Smith, M.D., F.R.C.P. Physician, National Hospital for Diseases of the Heart.	
ON THE VALUE OF THE ELECTROCARDIOGRAM IN GENERAL PRACTICE	603
By Adolf Schott, M.D. (Haidelberg), M.R.C.S. Clinical Assistant Guy's Hospital.	
THE USE OF INSULIN IN NON-DIABETIC MALNUTRITION WITH SPECIAL REFERENCE TO PULMONARY TUBERCULOSIS	613
By Philip Ellman, M.D., M.R.C.P. Consultant Physician, Tuberculosis and Chest Clinic and Harts Sanatorium, County Borough of East Ham; Consultant Physician, St. Stephen's Hospital (Rheumatic Unit), London County Council.	
THE TREATMENT OF GONORRHEA AND ITS COMPLICATIONS	624
By Harold Dodd, M.Ch., F.R.C.S. Surgeon, King George Hospital, Ilford, and Royal Hospital, Richmond.	
CLINICAL INDICATIONS FOR THE USE OF THE SPECIFIC HORMONE OF THE CORPUS LUTEUM	634
By C. Clauberg, M.D. Königsberg.	
GENERAL PRACTICE. XI.—ON WRITING MEDICAL PAPERS	642
By Sir Humphry Rolleston, Bt., G.C.V.O., K.C.B.	
THE DOCTOR'S LIBRARY	648
By the Librarian of the British Medical Association.	
INCOME TAX QUESTIONS	653

[CONTINUED ON PAGE IV.]

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CONTENTS—Continued

PAGE

PRACTICAL NOTES :—

Oxygen Treatment in the Home	655
Methylene Blue for Carbon-Monoxide Poisoning	656
The Present Status of the Prevention and Treatment of Influenza	656
Ichthylol in the Treatment of Wounds	657
The Use of Pentobarbital Sodium for Nausea and Vomiting following X-ray Treatment	657
The Treatment of Facial Injuries	658
The Use of Apple Powder in the Treatment of Diarrhoeal Conditions	658
Histamine for Rheumatism	659

REVIEWS OF BOOKS :—

Report of the Medical Research Council for the Year 1935-1936	660
Blood Cultures and their Significance (Butler)	660
High Blood Pressure (Harris, Aldred and James)	661
What is Osteopathy? (Hill and Clegg)	661
Latent Syphilis and the Autonomic Nervous System (Evans)	662
Halliburton's Handbook of Physiology and Biochemistry (McDowall)	662
The Common Neuroses (Ross)	662
Dietetics for the Clinician (Bridges)	662
Vitamins in Theory and Practice (Harris)	662
The Extra Pharmacopœia, Vol. I	662

NOTES AND PREPARATIONS —

Marienbad	663
Hunterian Society : Gold Medal for Practitioners	663
Acrosone (James Woolley, Sons & Co., Ltd.)	663
Daltose (Cow and Gate, Ltd.)	663
Kinoo Baby Powder (Kinu, Ltd.)	664
Prenatalac (Cow and Gate, Ltd)	664
Sangostop (Coates and Cooper, Ltd.)	664
Soluseptasine (Pharmaceutical Specialities (May and Baker), Ltd.)	664

CURRENT MEDICAL LITERATURE

lxxxvi

NOTES BY THE WAY

l

APPOINTMENTS

lxxxvi

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CONTENTS

VOL. CXXXVIII

JUNE, 1937

	PAGE
THE CARE OF THE PRE-SCHOOL CHILD FOREWORD	665
By The Rt. Hon. Sir Kingsley Wood, P.C. M.P. <i>Minister of Health</i>	
ACUTE RESPIRATORY DISORDERS IN THE PRE-SCHOOL CHILD	668
By Charles McNeill, M.A. M.D. F.R.C.P. <i>Professor of Child Life and Health, Edinburgh University</i>	
TUBERCULOSIS IN THE CHILD OF PRE-SCHOOL AGE	676
By Leonard Findlay, M.D. D.Sc. F.R.C.P. <i>Physician, Princess Elizabeth of York Hospital for Children</i>	
THE CARE AND TREATMENT OF INFLAMMATIONS OF THE NERVOUS SYSTEM IN THE PRE-SCHOOL CHILD	687
By C. Worster-Drought, M.A. M.D. F.R.C.P. <i>Physician, the Metropolitan Hospital and the West End Hospital for Diseases of the Nervous System</i>	
THE DIAGNOSIS AND TREATMENT OF CONGENITAL DEFORMITIES IN YOUNG CHILDREN	703
By Whitchurch Howell, F.R.C.S. <i>Senior Surgeon, Queen's Hospital for Children, London. Orthopaedic Surgeon, Essex County Council. Late Orthopaedic Surgeon, Ministry of Pensions, London</i>	
DISORDERS OF THE SKIN IN THE PRE-SCHOOL CHILD	716
By R. T. Brain, M.D. F.R.C.P. <i>Physician in Charge of the Skin Department, Royal Free Hospital and the Hospital for Sick Children, Great Ormond Street</i>	
DIET OF THE PRE-SCHOOL CHILD	727
By Catherine Chisholm, C.B.E., M.D. <i>Clinical Lecturer on Children's Diseases, Manchester University. Physician for Children, Manchester Northern Hospital. Physician, Duchess of York Hospital for Babies, Manchester</i>	
PLASTER OF PARIS TECHNIQUE IN THE TREATMENT OF SURGICAL TUBERCULOSIS AND OTHER CONDITIONS	736
By Sir Henry Gauvain, M.D. M.Chir. F.R.C.S. <i>Medical Superintendent, Morland Clinics, Alton, and the Lord Mayor Treloar Cripples' Hospital and College, Alton</i>	
CHRONIC AND IRREGULAR GOUT	749
By W. S. C. Copeman, M.D. F.R.C.P. <i>Assistant Physician, Children's Department, West London Hospital. Physician, Hospital of St. John and St. Elizabeth, Physician, British Red Cross Clinic for Rheumatism</i>	
RADIO-ACTIVE VASELINE: A NEW TECHNIQUE FOR SURFACE RADIUM THERAPY	769
By Albert Eidinow, M.B. B.S. M.R.C.S. L.R.C.P. <i>Honorary Physician, the St. John Clinic and Institute of Physical Medicine, Pimlico, and the Light Department of the Radium Institute</i>	
GENERAL PRACTICE. XII—FEES	774
By I. G. Briggs, M.C.R.S. <i>Barrister-at-Law</i>	

[CONTINUED ON PAGE 15]

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CONTENTS—Continued

PRACTICAL NOTES :—

PAGE

Glucose in Treatment	782
Prophylaxis of Asphyxia Neonatorum	782
The Treatment of Porriasis by Colloidal Manganese	783
The Treatment of Sciatica	783
The Treatment of Post-Operative Hiccough	784
Saline for Myocardial Infarction	784
Conservative Operation for the Cure of So-Called Ingrown Toenail	784
The Prophylaxis of Chickenpox	785
The Treatment of Menière's Syndrome	786

REVIEWS OF BOOKS :—

Milk Products (Harvey and Hill)	787
Milk and Nutrition	787
Diseases of the Eye (Wolff)	787
Practical Orthoptics in the Treatment of Squint (Lyle and Jackson)	788
Diets and Recipes and the Treatment of Diabetes and Obesity (Poulton)	788
Diseases of the Nose, Throat and Ear (Hall)	788
Handbook of Orthopedic Surgery (Shands and Raney)	789
The History of the Acute Exanthemata (Rolleston)	789
Medicatio Medici : A Doctor's Philosophy of Life (Boasquet)	790
Who'd be a Doctor : An Autobiography (Weymouth)	790
Diseases of the Nose and Throat (Thomson)	790
Buchanan's Manual of Anatomy (Frazer)	791
Synopsis of Pediatrics (Zahorsky)	791
Mothercraft (King)	791
The Morphine Habit and Its Painless Treatment (Scott)	791
The Medical Annual, 1937	791
British Health Resorts	791

NOTES AND PREPARATIONS :—

British Health Resorts Association Conference at Skegness, April 17, 1937	792
Energen High Protein Chocolates (Energen Foods Co., Ltd.)	792
Navigan (Roche Products, Ltd.)	792

CURRENT MEDICAL LITERATURE ... (xxxii)

NOTES BY THE WAY ...

APPOINTMENTS ... (xxxiii)

CALCIBRONAT

BIRTH SHOCK, TETANY AND

NERVOUS DISTURBANCES OF CHILDREN

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H. R. Litchfield, *Am. J. Dis. Child.*

1936. Vol. 52, pp. 1312-1318

THE PRACTITIONER

Edited by

SIR HUMPHRY ROLLESTON, Bt.,
G.C.V.O., K.C.B., M.D., D.Sc., F.R.C.P.

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THE USE AND ABUSE OF DRUGS AND PREPARATIONS

INTRODUCTION

By SIR HUMPHRY ROLLESTON, Bt., G.C.V.O., K.C.B.

THE eminently practical subject of the use and abuse of drugs covers an extremely wide field as is shown by the systematic accounts in the following articles dealing with the treatment of disorders and diseases of the various parts of the body. The uses of drugs have from early times been obtained as the result of various kinds (often somewhat accidental) of experience and of judgment, which the Father of medicine aphoristically declared to be respectively fallacious and difficult. Recently experiment has supplemented empirical observation, and guidance has come from pharmacology. But even on this scientific foundation success may not automatically crown the assumption that what holds good for experimental animals will always have exactly the same effect on *homo sapiens*. There may be well-marked differences in the reactions of the same species, and "what's one man's poison, is another's meat or drink." The method of trial and error may in the first instance have been an effort on experimental lines, but often it was embodied in blunderbuss prescriptions and thus deprived of any value. A few specific remedies—cinchona and mercury—are of such ancient lineage that their discovery is a matter of tradition or somewhat speculative.

In some instances what may be called "fortunate mistakes" have had a beneficial effect, not only on the individual patient but, by suggesting a new line of treatment, on his fellow sufferers. Thus Trousseau in 1864 intended to prescribe

tincture of digitalis for a patient with exophthalmic goitre, but actually wrote down tincture of iodine, and, when she came back, was astonished at the extraordinary improvement; he indeed somewhat reluctantly consented to the patient's appeal for more of the same medicine. Iodine was then given for a short time; but soon was entirely abandoned in the treatment of that disease, and was only re-introduced about forty years later by Weller in 1914, by Edward Mellanby in 1922, and by H. S. Plummer and W. M. Boothby in 1923 at the Mayo Clinic.

It is not unknown for an illegible prescription to lead to a dose far larger than was intended and to an improvement in the patients which the previous orthodox doses had failed to produce. Such improvement instead of toxic symptoms may perhaps in some instances be explained by that particular patient being hyposensitive.

Advances may also come about in quite unexpected ways in treatment other than that by drugs; thus laparotomy for a diagnosed ovarian cyst revealed tuberculous peritonitis and the abdomen was rapidly closed and the bad prognosis then thought to be only too obvious was contradicted; this observation was followed by this intentional treatment for ascitic tuberculous peritonitis. Similarly removal of the spleen from a patient diagnosed as having an ovarian cyst was followed by recovery from what afterwards was recognized as chronic hæmolytic splenomegalic or acholuric jaundice.

As a general rule, though exceptions are sometimes claimed in comforting testimonials, remedies really powerful for good are equally capable of doing harm when given in excessive doses to ordinary persons or when administered in small doses to hypersensitive individuals, namely those with an idiosyncrasy to the drug. It is therefore advisable to begin treatment with a small rather than a full dose, to listen to a patient's statement that he cannot take a particular drug, and to realize that each person is an individual with his own reactions and a dose that suits him best. It is a wise discipline always to consider, though not audibly, whether treatment is having an adverse instead of a beneficial effect. Drug

eruptions are not uncommonly the outward and visible sign of idiosyncrasy and hypersensitivity, and, unless this is borne in mind, for example in the case of a patient taking patent medicines surreptitiously, may be puzzling.

The persistent and persuasive advertisements of proprietary preparations in the lay press must greatly increase the amount of self-treatment, and thus entail dangers as well as superficial attractions to credulous and suggestible amateurs. There is probably more truth in the dictum that he who treats himself has a fool for his patient than in the proverb that every man is either a fool or a physician after thirty years of age, and the modification that every man at forty is a fool or physician, the last being particularly unfortunate in recalling another proverb "A fool at forty is a fool indeed." Of advertisements those in the medical press are exposed to professional criticism and censorship and may therefore be expected to be less exuberant in their claims and more worthy of attention. It is to the credit of many reputable firms of manufacturing chemists that they do not advertise in the lay press.

Besides a specific effect on the cells of the tissues, drug treatment may exert a beneficial effect psychologically, and prescriptions for placebos may then be a medium for treatment by suggestion. This method may be most useful in tailing off the dose of morphine in addicts by hypodermics of increasing proportions of water.

The outstanding abuse of drugs, often in the first instance, the result of humanitarian kindness rather than of the lessons of experience, is the formation of a habit with an overwhelming craving for a sedative or a stimulant. In our pages last July, Sir James Purves-Stewart arranged the drugs of addiction in order of serious danger as alcohol, morphine, heroin, and cocaine. This is such an important subject, though addiction is not so rampant in this country as is sometimes stated, that it may well be considered at length in some future number of *The Practitioner*.

THE USE AND ABUSE OF VITAMINS

By R. A. PETERS, M.C., M.D., F.R.S.

Whitley Professor of Biochemistry, University of Oxford.

THE constituents of a diet may be divided into two classes, those which are replaceable, and others quite essential in the sense that they cannot be replaced by other chemical substances. To the latter class belong the vitamins. They differ from essential amino-acids, such as tryptophane, only in the amounts required to form the irreducible minimum. For different vitamins, this indispensable small amount varies considerably in absolute weight. For instance with small animals, such as the rat and guinea-pig, the daily doses of certain vitamins may be given as follows, approximately, vitamin C (ascorbic acid) 0·5 to 1·0 mgm., of vitamins B and A 0·002 mgm., and of vitamin D 0·000,015 mgm. Hence by weight some 1,000 times more ascorbic acid than vitamin D is required to produce the necessary minimum. There is really a regular gradation in the absolute amount of the entities needed in a diet, until those constituents are reached which are required in large amounts as a source of energy rather than as part of the biochemical machinery for obtaining that energy.

The only object of separate dosing with vitamin (apart from that already in the food) is to raise the daily ration to the minimum amount required. Provided that this is reached together with a reasonable reserve store, no extra dosing with vitamin should do good. It must be realized that the vitamin content even of good food may vary with cooking, storage and other factors which are difficult to control, and therefore it is wise to give a margin of vitamins to cope with possible fluctuations in the diet. In the case of water-soluble vitamins such as those of the B class and vitamin C (anti-scorbutic), there seems to be no danger of overdosage, because excess is likely to be excreted in the urine. With fat-soluble vitamins such as D,

there is a possibility of overdosage, though in practice it seems that the degree of overdosage must be so large that it seldom occurs.

The above principles seem to be easy; with a complex town-dwelling population, their application is difficult for several reasons not immediately apparent. The average amount of each vitamin needed can be determined approximately for the normal individual; but it is certain that there may be cases of marked idiosyncrasy. A very good clinical example of this was given in experiments at Newcastle (Spence), where it was found that large amounts of vitamin D had to be given as a routine to certain exceptional children to keep them free from rickets. Such a happening is supported by laboratory experience with the vitamin B complex. Not unrelated to this is the uncertainty that vitamins when given by the mouth are properly absorbed, or destroyed in the intestine; if there is failure in absorption, a patient may be suffering from vitamin deficiency while vitamins are still being given in comparatively large amount. It follows as a corollary from this that the statement commonly made that because an individual eats a good mixed diet, he cannot be suffering from vitamin deficiency is mere dogmatism. The truth will not be known for certain until accurate and simple methods of estimating vitamins exist for the individual, sufficiently simple to use upon the large scale. It is clear that we should err on the side of caution, because excess is much less dangerous than too little. Common sense of course teaches that in adults there cannot be widespread and serious deficiency. Any arguments about the need for excess apply with particular force to children, and to pregnant and nursing mothers. Attempts are now being made to develop methods for estimating vitamins in blood and urine, so that in the comparatively near future accurate information in man upon these important questions will be available. In the meanwhile what is the correct course for the practising doctor? It is clear that indiscriminate use of vitamin preparations may be of advantage to those that market them, but it is unscientific and uneconomical whenever the patient's intake exceeds a reasonable daily

margin.

SCIENTIFIC INDICATIONS

Ideally in all cases in which the practitioner is called in to see a case of illness, he should assure himself that the diet of the individual is actually adequate. Lack of symptoms at any given time does not necessarily indicate that a person's diet is correct, because some vitamins (fat soluble) are stored for long periods. It is a common laboratory experience with animals to find that reserves of a vitamin may be sufficient to protect an animal for months, until the store quite suddenly runs out; then trouble due to vitamin deficiency may set in. The storage question makes an exact description of the indications for dosing with vitamins difficult. If a deficiency shows itself in any definite form, then it really means that the dietary fault has lasted for some time and is fairly well advanced.

It has been recommended as a guide by the Committee of the League of Nations that the following supplies should be reached in the case of pregnancy and lactation. This means that the supply can be somewhat less for the ordinary person, but should be of the same order for children.

Vitamins daily required by pregnant and nursing women (international units), vitamin A 8,700, vitamin B 250, vitamin C 1,120, vitamin D 340. These would be contained in milk 1,000 c.cm., meat 120 gm., egg one, cheese 30 gm., leafy vegetables 100 gm., potatoes 250 gm., legumes (solid) 10 gm., cod-liver oil 3.5 gm. [The vitamin B could be increased with advantage by supplements.]

The conditions which may require vitamin therapy are diverse. They range from night blindness to joint hæmorrhage. If the vitamin lack is acute, as for instance a sudden loss of vitamin B₁, with convulsive symptoms therefrom, then therapy should induce a rapid change. If on the other hand the patient is suffering from the chronic effect of a vitamin deficiency, then of course there may be a long delay in improvement since tissue repair will take a correspondingly long time. From this the following may be deduced: supposing that a vitamin deficiency is suspected, treatment with the appropriate vitamin should be instituted. In most cases a definite improvement should be noticeable within a fortnight or at least a month. If there is not improvement then, it must

either be assumed that the condition is not due to vitamin deficiency or alternatively that the vitamin is not reaching the seat of action. In other words injection may now be tried. If after a reasonable time injection has no effect, there is really no sense in continuing to dose with vitamin. The best thing is to ensure that the patient eats from that time onwards a thoroughly good diet with its adequate quota of protective foods. Any further continuance of such treatment would only be an unnecessary expense. I would, however, again stress the possibility of cases of idiosyncrasy. I know of a trained observer who is clear that a regular dose of halibut oil thrice daily is sufficient to ensure that he is able to carry on his work efficiently. He has controlled this by leaving off the dose at intervals and finding that he gets a recrudescence of catarrhal symptoms. Much more definite evidence of this type is wanted. At the moment there is some clinical experience of a limited type to guide in vitamin therapy in the human. There is, however, much more wanted, and this can only be supplied by the experience and critical observation of those in general practice.

CONDITIONS REQUIRING TREATMENT

The likely conditions which may require treatment can now be considered. It is best to discuss the vitamins in turn. *They differ widely from one another as chemical substances*, and as widely in their action as drugs such as strychnine and salicylic acid. As a general symptom of vitamin lack, probably failure of appetite is the most important, and the most important vitamin in this connection is vitamin B₁, the so-called anti-neuritic vitamin. Administration of vitamin B₁ in anorexia should be followed by rapid restoration if the failure is due to lack of this factor.

VITAMIN A, C₂₀H₃₀O.—This has been termed the anti-infective vitamin. Such a term is useful to draw attention to the regularity with which deficiency of this vitamin is associated with the appearance of infections, such as bronchitis, in the laboratory. The vitamin is a colourless oil. It is found in fish oils associated with vitamin D, and is especially abundant

in halibut-liver oil. It also arises in the body from carotene, the red colouring matter of carrots, a pigment which is present in plants and usually accompanies the green parts. The vitamin is stored in the liver. It protects mucous surfaces such as the conjunctiva from the entry of foreign organisms, and is also a constituent of visual purple, the diseases of keratomalacia and of hemeralopia being associated with it. Tests for the vitamin have now been worked out which depend upon the speed of accommodation to dark conditions. In addition it has been claimed that some of the earliest changes induced by lack of this vitamin are to be found in the nervous system. Hence, the vitamin is worth a trial as a protection against infection, as a cure in certain eye diseases, and also in obscure nervous diseases involving degenerative changes.

VITAMIN B COMPLEX, now consists of several parts of which only one is certainly applicable to man, though it is an inference that more may be required.

VITAMIN B₁, C₁₂H₁₇ON₄S. ClHCl, also known as oryzanin, torulin and aneurin. This is the base of pyrimidine type containing sulphur, and has now been synthesized. In contrast to vitamin A it is water soluble and is not stored in large amount. The vitamin is connected with the intermediary metabolism of carbohydrates, and is probably a universal constituent of cells, it being an accident that the nervous system shows the symptoms due to lack of this vitamin first. It cures the condition of beri-beri, and this may be taken as an indication of its clinical application. It should be tried in all cases of loss of appetite, in which a cure should rapidly follow if the condition is due to this deficiency. There are also indications that it may be useful in oedema, in breathlessness, anorexia nervosa, neuritis, painful muscles. Before deciding that any given condition is not due to lack of this factor, injection (preferably intravenously) should be attempted. Effects upon oedema and upon appetite should show quickly; improvements in neuritic conditions if due to this cause might not be expected to be so rapid. An amount corresponding to at least 5 to 10 mgm. of the pure vitamin should be given in any trial; this means some 5,000 international units.

LACTOFLAVIN, $C_{17}H_{20}O_6N_4$.—This factor is also basic and allied to the pyrimidines in structure; it has recently been synthesized. The factor has been proved to be necessary for growth in animals and also to relieve scurf-like symptoms which occur in its absence. There is no evidence available as to its effects in man; the field seems an open one for clinical trials.

Remainder of vitamin B complex.—The use of yeast for the cure of skin conditions is of long standing, and it has the support of animal work. There is a strong probability that there are as yet undefined factors, for instance the pellagra-preventing, which make yeast useful in skin conditions.

VITAMIN C, $C_6H_8O_6$.—This is also water soluble, has been synthesized and is allied to the sugar acids. The factor is highly reducing, and is not stable in neutral or alkaline conditions, though this is modified by the presence of mere traces of metals which render it highly unstable. It is present in orange juice, and is of course the anti-scorbutic principle. Therapy is indicated in cases in which orange juice is unacceptable or when rapid action is desired. Orange juice should certainly be tried as a therapeutic agent in purpura.

VITAMIN D, $C_{28}H_{44}O$.—The compound is derived from ergosterol by irradiation and is known as calciferol. More than one compound with vitamin D action is known. The factor is fat soluble and is therefore stored in the body. It is concerned with absorption of calcium and phosphorus from the gut; the clinical indications for its use (apart from gross changes in the bones such as are found in rickets and osteomalacia) are lowered content of the blood in calcium or phosphate; in some conditions such as idiopathic steatorrhœa, there is hypovitaminosis D. It must be mentioned that no vitamin D therapy can be of use unless the supply of phosphate is adequate; and that it is unwise to eat a diet which contains a huge preponderance of calcium over phosphorus. Some 500 units a day given as cod-liver oil or as a purer source of vitamin D are needed to protect children from rickets. In no case is it advisable to give cod-liver oil in large doses, as there are contra-indications to its use in this way. Attempts to cure

rickets should not be discontinued until injection has been tried.

VITAMIN E has not yet been synthesized. It is fat soluble and is needed to protect the reproductive system. It has also been suggested that it may be of value in habitual abortion.

CONCLUSION

This short sketch has been given as a guide to clinical use, but it is hoped that those who have the opportunity to make careful observations* upon the value of the vitamin preparations which are now at the disposal of the profession owing to the labours of biochemists and the enterprise of industry, will use the above remarks merely as an indication for the study of clinical applications of these substances. In many cases, apart from proved effects of vitamin B₁ in beri-beri, of C in scurvy and of D in rickets, there must be clinical conditions that will be helped by this therapy; at the same time it is evident that a continued use of such preparations when there is no clinical evidence of improvement is wasteful, and might even be doing actual harm. For instance it is not yet clear if excessive action of vitamin D in elderly people predisposes to some form of calcification of arteries. Such a condition might quite well be precipitated by sunlight at the seaside with its consequent increase in the vitamin D content by illumination of the skin.

** Practitioners are invited to write and record their experiences with modern vitamin preparations. These will not necessarily be published, and the Editors will ensure that the information of the type asked for by Professor Peters is passed on to him.*

THE USE AND ABUSE OF SEDATIVES

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SEDATIVES exert a depressing influence on the organs to which they are directed. They are of value therefore in the treatment of many diseases in which physiological rest for the affected organ is desired. Cerebral sedatives, for example, are used frequently, and are of great value in both functional and organic disease, for the relief of nervous symptoms and insomnia. Visceral activity is often greatly influenced by emotional disturbances, hence a brain sedative may also act as a visceral sedative.

CEREBRAL SEDATIVES

The bromides, alcohol and paraldehyde have a direct depressing effect on the cerebral cortex. The derivatives of barbituric acid act also on the cortex but, in addition, probably have a further depressing effect on the thalamic region. Morphine depresses most regions of the brain, particularly that part which appreciates pain: in addition it has a strong sedative effect on the respiratory and the cough centres. It tends to stimulate the vagus centre and thus causes slowing of the pulse, and sometimes vomiting.

Those people who tend to be neurotic or neurasthenic often derive great relief from cortical depressants such as the bromides. Their whole nervous system is over-alert—they jump at a sudden sound and are unable to relax either mentally or physically. Before prescribing a cerebral sedative it is important to bear in mind that, when such people come to consult their doctor, they are often in a state of nervousness, apprehension or fear. Their state of anxiety aggravates the symptoms of disease, and may in itself produce a series of distressing symptoms, such as headache, nervousness, loss of confidence, palpitation, breathlessness, flatulence, diarrhoea,

loss of appetite, polyuria and sleeplessness. A vicious circle quickly develops in persons suffering from the common anxiety state, and while the indiscriminate prescribing of sedatives to these patients does much good, such cases require careful investigation. A patient, for example, with malignant disease, may also be in a nervous state, and the doctor may be so impressed by the neurotic element that he fails to recognize the presence of the associated organic disease. When there is no serious organic disease present, the removal of unnecessary anxiety or fear is even more important than the administration of sedatives. When circumstances in the patient's life have caused severe nervous symptoms, sedatives are of value, but should be combined with an attempt to protect the patient from unnecessary mental trauma. Sedatives are not of much value in true hysterical states, for the sufferers from this type of disorder are usually quite placid and are subconsciously well content with their disability.

After investigating a case of some difficulty, the practitioner is often uncertain whether the symptoms are due to organic disease or to a functional nervous disturbance, or to a combination of the two. He is repeatedly faced with the difficult problem—*is this just a neurosis or is there some developing organic disease?* He knows that in most cases of this type the symptoms are dependent mainly on psychogenic disturbances, but he remembers perhaps that when a certain patient of his, who died of some fatal disease, first came to see him, he thought the condition was a neurosis. The hesitating attitude of the profession to this type of patient has caused it much loss of prestige and gives the quack many opportunities to score. The quack always appears to know both the cause of the symptoms and the cure, and his confident attitude will, in itself, remove a remarkable number of symptoms. The practitioner will be just as successful if he, in doubtful cases, adopts a positive and confident attitude towards his patient, such as: "I am glad to say there is no sign of serious disease. Your symptoms are due to . . ., which should be easily corrected. I want you to take this medicine for a week and report and see me again." The prescription in such a case will contain some

sedative which, combined with the doctor's confident attitude, will often remove ominous symptoms with surprising thoroughness. He will not, however, succeed in relieving the condition if he betrays to the patient any doubt he may have regarding the diagnosis. If the symptoms persist in spite of this reassurance and encouragement, the case should be investigated in full, by a consultant if necessary, for it is most undesirable that there should be any element of doubt regarding the diagnosis of a case of possible neurosis. It cannot be too strongly emphasized that in nervous patients the relief of anxiety which they experience when their doctor inspires their confidence, is a more potent healer of suffering than is the prescription of sedatives.

A business man, aged 56, developed rheumatoid arthritis which necessitated his giving up work. He had never been ill before, and he became highly emotional and worried about himself. When examined some months later he was unable to walk and had to be helped even to move about in bed. Examination showed only early arthritis, quite insufficient to cause so much disability. He was given ten grains of sodium bromide three times daily, his anxiety regarding the gravity of his case was corrected, and he was encouraged to exercise freely. Within two days he could walk quite well, and the real degree of incapacity could then be accurately determined.

The above is typical of many cases of disease and demonstrates the importance of correcting and relieving psychological disturbances, whether or not organic disease is present.

SEDATIVES FOR EPILEPSY

Unfortunately the use of sedatives remains the most powerful means available for treating epilepsy in the absence of organic disease of the brain which can be relieved surgically. The treatment consists of prescribing a sedative, such as sodium bromide or luminal, which is taken regularly every day for a period of many months or years. If a small dose taken once daily (say one grain of luminal at night) stops the attacks, so much the better; but if not, the dose is given more often during the day, in the same or smaller doses, provided drowsiness does not result. In some cases treatment along these lines entirely prevents the fits occurring; in others, the number and severity of the attacks is reduced, while in some, treatment is of no benefit. In many cases of epilepsy the fits occur at certain times of the

day and it is then desirable to give a dose of the sedative not long before the attack is expected. In some cases of nocturnal epilepsy, however, the taking of a sedative before retiring has the unfortunate effect of making the fits occur in the day-time instead of at night. In such cases therefore the treatment is actually harmful from the point of view of the patient's ability to do his work, and should be discontinued.

In cases of status epilepticus, paraldehyde, if given freely, seldom, if ever, fails to arrest the convulsions: 240 minims in four ounces of water are given by the rectum and, thereafter, 120 minims of paraldehyde diluted are given every half hour by the rectum until the fits cease.

CHOICE OF A SEDATIVE—DANGERS

The choice of cerebral sedatives is partly a matter of fashion and individual bias; it is often impossible to prove that one sedative is better than another. The bromides are most employed and are of great value. They have a pure depressor effect on the cerebral cortex, and many patients take ten or more grains of a bromide salt three times daily for a period of many months or years without suffering any ill-effects. Bromide skin eruptions sometimes develop but can usually be prevented by adding a few drops of liquor arsenicalis to each dose. Though the bromides are in many ways the safest of the sedatives, they also may be dangerous, for bromide tends to accumulate in the body, and serious, and even fatal poisoning may occur. There is no danger if the possibilities are kept in mind. Neurotic patients often take bromides in considerable quantities over a long period. If their mental condition deteriorates, if they become excited or confused, the bromide which they have taken, perhaps for years, is seldom blamed, indeed the dose is often increased. Yet it is just in this insidious way that bromide poisoning develops. In such a case all drugs should be stopped, and sodium chloride and water should be given freely to displace the bromide accumulated in the body tissues.

In states of toxic delirium such as delirium tremens when sedative treatment is urgently required, sodium bromide (30 grains) with chloral hydrate (20 grains) remains a most valu-

able method of treatment which is both safe and effective. The full dose may be repeated in an hour if necessary. The subcutaneous administration of morphine ($\frac{1}{4}$ grain) with hyoscine hydrobromide ($\frac{1}{100}$ grain) is also effective in quietening delirious states. The injection may be repeated in an hour if necessary. Unfortunately hyoscine sometimes causes excitement. Paraldehyde is safe and has a strong sedative and hypnotic action if given in adequate amounts: 120 minims (diluted) may be given by the mouth and thereafter 60 minims may be given every half hour until the desired degree of depression is obtained.

The derivatives of barbituric acid are much used both for their sedative and hypnotic action. About sixty of these substances are already known and it is almost impossible to assess accurately their relative merits. Though the drugs of this group are for the most part rapidly excreted, overdosage may result from a cumulative action. They are all dangerous poisons in large doses, and not only is the margin between the medicinal and the toxic dose small, but the individual tolerance varies greatly. The possession of a large bottle of tablets gives the patient an easy means of committing suicide. Not only may a fatal dose be taken deliberately but, if the tablets are kept at the bedside, several may be taken accidentally if the patient is already under the influence of the drug and therefore not fully aware of his actions. It is wise therefore to prescribe small quantities only of the barbiturates to unreliable patients. Death may be caused by 15 grains of luminal and by 28 grains of dial, but the average fatal dose is more than double this quantity. Mental confusion, excitement, ataxia, or varying degrees of coma may indicate that poisoning has occurred. Coma may continue for several days during which period pulmonary complications are liable to occur. Habit formation is also a danger common to all the drugs of this group. The main difference between them is the variation in the duration of their action. Phenobarbitone (luminal) is relatively slowly excreted and is therefore of special value in the treatment of epilepsy. Those barbiturates which are most suitable for use as hypnotics are more quickly excreted, and those with the

shortest action, such as amytal, are used for pre-anæsthetic medication. When a pure sedative effect is desired, the bromides provide the simplest and the safest remedy; for though the cumulative action of the bromides, if taken for a long period may become dangerous if the possibility of poisoning is forgotten, fatal poisoning from a single dose has probably never occurred in man. A simple prescription such as the following will bring relief to many neurotic patients:

R. Sod. brom.	-	-	-	-	10 grains
Tinct. nuc. vom.	-	-	-	-	10 minims
Liq. arsen.	-	-	-	-	5 minims
Inf. gent. co.rec.	-	-	-	-	to $\frac{1}{2}$ ounce

Three times daily after food.

A small amount of a barbituric acid derivative taken at night is often a useful addition.

The phenol derivatives, such as aspirin and pyramidon, must also be mentioned, for they are widely used and are of great value for their action in depressing the perception of pain. Alcohol is a useful sedative in many chronic diseases and particularly in elderly patients who suffer from insomnia. Its use is, however, better avoided in cases of neurosis owing to the danger of alcoholism developing in this type of patient.

SEDATIVES IN HEART DISEASE

In cases of acute or subacute heart failure the giving of a suitable sedative is perhaps the most valuable remedy available. The patient's restlessness and distress should be relieved, if only to give rest to the myocardium. The opiates are the most valuable sedatives in such cases, but must be given in small doses till the patient's tolerance is observed. Morphine $\frac{1}{8}$ grain may be given hypodermically, and repeated in half an hour if the patient is still restless and distressed. Thereafter the dose is adjusted to the patient's tolerance and is given as often as is necessary to ensure sufficient rest. Practitioners often hesitate to give sedatives to severe cases of heart failure, but if given in small amounts as outlined above, opiates may be given safely, and with great benefit in cases even of profound cardiac collapse. Cardiac stimulants must, of course, also be given. The free use of the opiates in the late stages of congestive heart

failure certainly prolongs life and gives great mental and physical relief to the patient. The value of morphine in cases of coronary thrombosis and certain advanced cases of angina pectoris is well known. Here again the first dose should be small— $\frac{1}{8}$ grain—until the patient's reaction to the drug is observed. It is, of course, only in severe cases of heart disease that morphine should be given. In less severe cases milder sedatives, such as the bromides or luminal, are valuable if taken regularly for they lessen apprehension and restlessness and may thus reduce the heart rate and lower the blood pressure. This beneficial action may also be due to a slight lowering of the basal metabolic rate which always helps an embarrassed heart. The barbiturates and paraldehyde are valuable when sleeplessness is troublesome.

RESPIRATORY DISEASE

Sedative cough mixtures are used to allay cough with little expectoration. It is customary to avoid sedative mixtures when there is much expectoration, but sedative mixtures can often be confidently given even when expectoration is abundant. In cases of bronchitis the patient often tires himself and irritates his respiratory passages by coughing more than is necessary. A sedative cough mixture containing, say a small quantity of codeine will give such a patient great relief. The soothing effect of a warm moist atmosphere will further add to his comfort.

The value of sedative mixtures is well seen in cases of advanced pulmonary tuberculosis with abundant sputum. This is particularly noticeable in the late stages when the expectoration is partly due to pulmonary oedema caused by failure of the right side of the heart. In such cases the free administration of morphine gives great relief. Codeine, if effective, is preferable to morphine, for its administration involves little risk of habit formation, and it has a special power of depressing the cough centre. Syrupus codeinæ phosphatis in a dose of 30 to 120 minims is a useful preparation.

In the early stages of pneumonia the value of opiates in

enabling the patient to rest and sleep is fully recognized. The patient's tolerance should be carefully estimated by commencing with, say, morphine $\frac{1}{8}$ grain hypodermically and increasing the dose only if the $\frac{1}{8}$ grain is insufficient to allay restlessness and pain and to allow sleep. Owing to its depressing effect on the respiratory centre, many authorities avoid giving morphine in cases of lobar pneumonia as the disease approaches its crisis. Experience shows, however, that morphine can be continued with advantage throughout the whole course of the disease, provided that the smallest necessary dose be given. More than $\frac{1}{8}$ grain of morphine should not be given until it has been shown that this amount has no soothing effect on the patient in question. Paraldehyde is often given to ensure sleep in cases of pneumonia, but morphine is on the whole more effective.

ABDOMINAL DISEASES

Sedatives in abdominal diseases are given mainly to lessen the activity of visceral muscle and to relieve pain which is caused by the spasm of visceral muscle. Atropine and the opiates are the most effective, but they should on no account be given until the case has been finally diagnosed. If a consultation is deemed advisable, the patient should not be under the influence of morphine when the specialist examines the case, for morphine masks the important signs in cases of "acute abdomen." The signs, for example, of intestinal obstruction, acute appendicitis, or of perforated peptic ulcer may be so seriously masked by an injection of morphine that clinical diagnosis is made very difficult.

The opiates have a marked effect in lessening gastric and intestinal activity. They are useful, therefore, in cases of acute colitis. They should be used with great care in cases of recurring colitis owing to the danger of habit formation. Morphine and atropine together relieve the pain of biliary and renal colic satisfactorily.

THE USE AND ABUSE OF ALCOHOL

By CLIFFORD HOYLE, M.D., M.R.C.P.

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ALCOHOL is to-day undoubtedly a far less popular remedy than in the last century. Prejudice and a fuller recognition of its admitted harmful effects are both responsible to some extent, but there are many other factors that have had an influence. Fashion is one, and here it has kept pace with the decreasing consumption of alcohol as a whole. But there is another and more important reason why alcohol should now be less fashionable than in former days; for in many ways it is an unproven remedy, and thus like others with a similar reputation has been discarded or superseded. Scarcely any substance in the Pharmacopœia has been investigated more, and yet many of its effects during illness are still not accurately understood. The difficulty has been that the bulk of investigations done have dealt only with its effects upon normal animals or men, or upon those addicted to its use. There has been no comparable series of accurate observations on its therapeutic as distinct from its pharmacological use, with a very few exceptions. The value of alcohol has thus remained for years a subject of discussion with often quite inadequate evidence either for or against its use. Meantime critical judgment has had to remain in a state of suspended animation. With this reservation in mind the use and abuse of alcohol in treatment will necessarily have to be discussed here chiefly from the standpoint of its actions in normal subjects.

LOCAL ACTION

Many of the most important uses of alcohol depend upon its local action upon surfaces. The simplest of these is that by evaporation it produces cooling if applied in free contact with the air. Weak strengths are all that are needed for the purpose,

as in the lead and spirit lotion:

R	Strong solution of lead acetate	-	12 minims
	Alcohol (90 per cent.)	- - -	60 to 120 minims
	Water	- - - -	to 1 ounce

Sponging with such solutions often greatly relieves the cutaneous discomforts of febrile patients, or those with irritative rashes. If stronger solutions are used, and especially if they are applied with friction or protected from evaporation, the alcohol dissolves out the fats in the superficial layers of the epidermis, cleaning the skin free from dirt and many organisms. The precipitation of surface proteins then leads to irritation and an astringent action; the former makes alcohol a valuable counter-irritant, and the latter is especially useful in the prevention and treatment of bed-sores. The preliminary burning sensation and subsequent slight anæsthesia mask itching and referred pain. For this purpose the alcohol is usually also used as a solvent for some other counter-irritant or local analgesic drugs, as in the linimentum aconiti, linimentum belladonnæ, linimentum camphoræ ammoniatum, and linimentum saponis of the British Pharmacopœia. All these liniments contain between 54 and 85 per cent. of ethyl alcohol. Anti-pruritic lotions often take advantage of the local anæsthetic action of the phenols, using alcohol again as a vehicle and to fortify the effect:

R	Phenol	- - - -	240 grains
	Camphor	- - - -	240 grains
	Rectified spirit	- - - -	q.s. to 3 ounces.
R	Solution of coal tar	- - -	60 minims
	Glycerin	- - -	1 ounce
	Rectified spirit	- - -	3 ounces
	Water	- - - -	to 8 ounces.

In the prevention of bed-sores by the use of alcohol it is advisable to get as much rubefacient action from the drug as possible by using a strong solution (surgical spirit) and applying it with steady friction.

The antiseptic action of alcohol is allied to its local effects. A strength of 70 per cent. is the most effective for this purpose; concentrations above 80 per cent. and below 60 per cent. are

said to be almost inactive against bacteria, perhaps because they do not penetrate the organisms so readily. Christiansen, some years ago, testing the comparative efficacy of various antiseptics for skin sterilization, found 70 per cent. alcohol to be better than either 2 per cent. phenol, 0·1 per cent. mercuric chloride, 4 per cent. formaldehyde, Dakin's solution, ether or acetone. Alcohol alone is thus quite suitable for this purpose. The addition of iodine is probably superfluous. It has the advantage over solutions of picric acid that rashes are avoided provided that alcohol alone or surgical spirit is used. Methylated spirit should not be applied to the skin on account of the risk of dermatitis; this is due, most probably, to the pyridine that it contains in order to make it undrinkable.

GENERAL ACTION

The local action of alcohol as an irritant is well marked when it is taken internally, though more especially if in concentrated form when the stomach is empty, and if long continued. These are the factors prone to lead to an alcoholic gastritis, as in heavy cocktail drinkers. The immediate effects of single doses are chiefly reflex upon the medulla and upon the gastric motility and secretion. The former are rarely pronounced, are quite transient, are seen best with concentrated solutions, and are influenced greatly by the reaction of the individual to his surroundings at the time. A slight rise in the pulse and respiration rates is generally all that can be discerned, perhaps with a similar slight rise in the blood pressure. It is these actions that have given alcohol its reputation as a stimulant in simple vasomotor faints, and they have no other real application. They are so slight that it is difficult to believe that they are of value even here.

The local action and flavour of alcoholic drinks, especially the bitters, increase the salivary and gastric secretions and improve appetite. There is a limiting concentration of about 20 per cent., and if this is exceeded in the stomach the secretion and rate of digestion are then diminished. Taken after meals alcohol acts as a potent carminative by relaxing the cardiac sphincter of the stomach. A mouthful of old brandy

or a liqueur taken neat are the most effective for this purpose, no doubt from the ethers or volatile oils that they contain. In normal people all these actions are superfluous, and may in time with regular consumption easily lead to an unwanted gain in weight. The position is different in debilitating illness, sometimes in convalescence, and in old age. Here alcohol may well help to restore a jaded appetite. It is taken best as sherry, lager, light beer, or still white wine, and with meals. In the elderly it has an especial value for the atonic type of dyspepsia that is then so common; here wines are better than the more dilute lagers and beers that are too bulky. In all dyspeptic subjects port is wisely avoided on account of the astringent tannins that it contains.

In using alcohol for its gastric effects the risk of habit has always to be kept in mind, and such a use must be discriminate. Those who are acutely ill are not likely to form a habit; and in those with some form of incurable disease it may be a blessing. The chief danger of forming a habit is when alcohol is used during convalescence; in deciding upon this a knowledge of the patient's character and family stock is an important guide. Habit depends far more upon the type of patient than upon a doctor's prescription. The neurasthenic is a dangerous recipient of alcohol, as of other drugs of addiction.

ALCOHOL AS A FOOD

In all the conditions just considered the effects of alcohol upon nutrition are augmented by its action as a food. Absorption begins in the stomach and is rapid, for alcohol can be detected in the blood within five minutes of administration. It reaches a maximum concentration there after about one and a half hours. As it needs no preliminary digestion it has a certain advantage over fats and proteins as a readily available source of energy, for over 90 per cent. of that ingested is completely oxidized yielding seven calories per gramme. This corresponds to more than 100 calories for each ounce of whisky. It can thus replace both fats and carbohydrates in the diet, and spares both these, and protein also after a few days, except with excessive doses. There is thus a gain in weight or preven-

tion of wasting. The oxidation of alcohol proceeds at a steady maximum rate of 10 c.cm. an hour in man, equivalent to three quarters of an ounce of whisky. The most that could be utilized in a day would thus be about 240 c.cm. yielding 1,680 calories, or the amount contained in 13 ounces of whisky. Actually it is less than this figure except in those habituated to its use, but the "bottle a day" man supplies the bulk of his basal energy requirements out of alcohol alone, and commonly of course takes little other food. As much as 500 calories a day are commonly obtained by workmen in France from alcohol alone as a part of their diet. It is thus easily possible to supply to invalids a considerable proportion of their nutritional needs as alcohol, though protein must be added. The chief objections to a wider use of this property are that alcohol is toxic in amounts that are of much use as a food, that there is also the ever present risk of habit to be considered, and that there are other foods equally suitable but which have not got the two disadvantages from which alcohol suffers. Almost the only occasions upon which the use of alcohol as a food is valuable arise during the course of acute fevers, such as typhoid fever and pneumonia, and in chronic wasting diseases. As an emergency ration in the former alcohol deserves a place, though not an important one. Glucose or barley sugar can almost always be taken in liberal quantities, and they have all the advantages of alcohol as a food and none of its drawbacks.

Apart from that of a food, the chief action of alcohol after absorption is to depress the central nervous system. Even the smallest doses have this effect, and it shows first by a reduction in the speed and accuracy with which mental processes and delicate movements are carried out, and by a reduction of the acuteness of sensation. Judgment, attention, and the will power necessary for work of a precise nature are thus affected quite early. Type-setters, for instance, do 9 per cent. less work after moderate amounts, and in addition there are more errors. The professional acrobat is well aware of the risks from alcohol taken before a performance. Unskilled manual work however, is hardly affected; while there is no falling off in

output there is also no improvement, although alcohol lessens the sense of fatigue. An important effect is the early reduction in the normal sense of responsibility; the drinker feels to be doing well, though actually there is a steadily increasing divergence between his conception of his own performance and the reality. There is produced a state of mind that has been likened to the absent-mindedness of the subject found by test to be accident prone.

THERAPEUTIC EFFECTS

Applied in therapeutics these actions can sometimes be of particular benefit in acute or incurable disease. They secure relief from the fatigue and boredom of illness, and often overcome its hundred and one discomforts. In the relief of frank pain alcohol has none of the specific effects of morphine. By abolishing anxiety and depression it can often prevent the mental attitude of a patient from having unfavourable reactions upon the course of his disease. Sleeplessness is an example, and it is in the insomnia of apprehensive patients that alcohol has an especial field as an hypnotic. For this purpose a half to one ounce of good brandy, whisky, or rum is the best form, and it should be taken added to a hot drink, tea or lemonade, so that absorption will be facilitated. Alcohol also aids the action of other hypnotics; a dose of veronal, for instance, is more effective when taken along with a little alcohol, no doubt because it is more easily absorbed. If alcohol alone leads to a stage of excitement then it can with advantage be used in this combined way. Delirious patients are often soothed by alcohol, and in former days this was one of its chief uses. The old adage that "wine is the milk of old age" expresses the sedative value that elderly people get from a moderate daily use.

The other effects of alcohol after absorption are seen mainly from its action on the circulation, but they are of minor importance. By depressing the heat-regulating centre it leads to flushing of the skin and sweating. This diaphoretic action may be used in high fever, though it is far less efficient than warm sponging. After moderate doses there is little or

no fall in blood pressure although the skin vessels are dilated; the reason is that the vasomotor centre remains active and compensates by appropriate constriction of the splanchnic arterioles. So far as the heart is concerned there is no evidence to point to any direct stimulant effect in man. All the trivial changes in the circulation under alcohol are to be attributed rather to its reflex effects from the mouth and to vasodilation. The output of the heart is scarcely affected, though there may sometimes be a slight rise in those not accustomed to taking the drug. In any case the effect is quite transitory, and though conceivably it may be more marked in certain diseased conditions, there is no evidence to support such a view. The practice of giving alcohol regularly as a cardiac stimulant in acute illness derives no support from its pharmacology; and its clinical use has been condemned as often as it has been praised. Many years ago Yeo wrote of the error of giving it as a routine in pneumonia, especially during the early stages. The value of alcohol to those with congestive heart failure is that of a sedative; Holland gin has, perhaps, a particular reputation here, probably on account of the diuretic action of its oil of juniper. Alcohol has a popular reputation also for the relief of attacks of angina of effort. For this purpose it is much inferior to glyceryl trinitrate, though in patients whose attacks are accompanied by flatulence the carminative action of brandy or a liqueur often brings relief.

From the evidence upon the use and misuse of alcohol that has been reviewed it is clear that its place in treatment is strictly limited. Within this limited field, however, it can upon occasion have a very real value.

THE USE AND ABUSE OF SERUMS AND VACCINES

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PRESENT-DAY knowledge of immunity may be said to have started with Jenner's discovery in 1796 that inoculation with cow-pox protects against subsequent inoculation with smallpox. This fundamental discovery was not extensively exploited until the Pasteurian era at which time anthrax and hydrophobia were found to be diseases for which active immunization with an attenuated living organism was effective in preventing disease. It remained for Almroth Wright to show that, in the field of active immunization, it was possible to obtain a prophylactic effect with a much safer specific remedy, namely, suspensions of killed organisms (vaccines) and that judicious injections of similar suspensions could be used for the actual treatment of disease. Antigens for active immunization also include various types of tuberculin, certain toxins and their relatively non-toxic derivatives known as toxoids.

Passive immunization with serum dates from von Behring's preparation of diphtheria antitoxin in 1890. Since then it has consistently been found that for those bacteria which produce an exotoxin, a potent and effective antitoxin can be prepared. On the other hand, bacteria which produce their effects by endotoxic action have in many instances defied the preparation of a potent anti-serum for passive immunization; notable exceptions are pneumococcal anti-serums (types I, II, V, VII and VIII), Sclavo's serum for anthrax as well as serum from human convalescents from certain virus diseases; all of these are effective.

Immunization of the human subject can never be carried out according to pharmacopœial rules. The response and reaction vary greatly from one person to another and the amount of antigen or antibody required for a particular case demands a nice judgment and considerable experience in order to obtain the best results.

GENERAL PRINCIPLES

It is fair to state that a specific serum or vaccine may be used rationally, justifiably, and often with invaluable effect in all infections in which experimental laboratory evidence or accumulated clinical experience has shown that such measures are effective in producing or assisting to produce immunity. This generalization needs to be amplified in the light of clinical experience in order to assess properly the chances of obtaining a good effect.

Obvious pitfalls and abuses of specific preparations come readily to mind. It is an abuse to use a specific remedy when there is no bacteriological proof or sound clinical evidence as to the nature of the infecting organism, or, no reasonable grounds for believing that bacteria cultivated from various sites or various excretions have any relations to the clinical condition. It is an abuse, and indeed a crime, not to recognize the essential difference between active and passive immunization; to apply the active method to patients who are acutely ill, who are already overloaded with their own antigen and who are ill because they lack the antibody which they themselves cannot produce. It is an abuse to subject a patient to a long, perhaps painful, course of vaccine therapy when the infection itself is but a secondary event; say, the result of some anatomical abnormality, such as a kinked ureter or a badly deflected nasal septum. Such abuses are gross, even childish, and are not such as would ever trouble those who have grasped the elementary principles of immunity or who are accustomed to make a routine clinical examination. Minor abuses arise largely from lack of experience; a failure to recognize the great variation in individual requirements and a tendency to follow slavishly a schedule of dosage supplied by a manufacturer or a bacteriologist, which schedule is necessarily designed for the *average* person, not the individual. Knowledge of optimum average dosage is founded on Almroth Wright's pioneer work with the opsonic index; a vast labour extending over many years (nowadays rarely given its just acknowledgment), which revealed the phenomenon of the "negative phase" as well as the depressing effects of over-dosage. Unfortunately the opsonic index is quite impracticable for a routine control and

reliance has to be placed on clinical judgment and a knowledge of what is a favourable and what an unfavourable reaction.

PASSIVE IMMUNIZATION (SERUM THERAPY)

General Principles.—Such treatment is designed to overcome a crisis; it confers an immunity which lasts at most a few weeks; but this, in an acute infection, is all that is desired. Serum therapy is therefore of most use in acute, extensive or generalized bacterial infections and especially in those infections in which the pathological effects are due to a circulating soluble exotoxin. Serum has also a limited but valuable use for prophylactic purposes. Modern concentrated serums are relatively protein-free and there is neither the need for the enormous doses which were at one time essential nor any grave danger of anaphylactic shock when the intravenous route has to be used. A dose of 20 to 40 c.cm. per day of most of the *antitoxic* serums is ample; if effective there should be a favourable change in the patient's condition within a few days; if such a favourable change occurs then persistence with the serum is usually rewarded. With highly toxic conditions, such as *gravis* diphtheria infections, much higher doses may be required.

Uses.—The value of diphtheria antitoxin, and of scarlatinal antitoxin for erysipelas, is unquestioned. Scarlatinal antitoxin has also a valuable action, and may therefore justifiably be used, in a fair proportion of cases of acute localized or generalized streptococcal infections. Staphylococcal antitoxin is useful in the same way in severe local or in generalized infections. For the toxæmia of bacillary dysentery caused by Shiga's bacillus the antitoxin is invaluable. Botulinus antitoxin provides the only hope of treating a highly fatal disease, and the other anærobic bacillary antitoxins, tetanus, and *B. welchii*, are invariably used in their corresponding diseases.

Of antibacterial serums the specific pneumococcal types I and II are of proved value, types V, VII and VIII are as yet only in the experimental stage; they are effective only when given by the intravenous route and are preferably used in the early stages of the disease. Anti-meningococcal serum has recently been improved, but the value of administering the serum by the intrathecal rather than the intramuscular or intravenous route is doubted by many experienced immun-

ologists. Human serum from convalescent cases of measles, poliomyelitis, and true epidemic influenza are valuable for the *early* treatment of these virus diseases; but supplies are difficult to obtain. Convalescent measles serum is best used during the incubation period of the disease for the purpose of producing a modified attack of measles rather than for actually preventing the disease; this requires a nice adjustment of dosage according to age and to the time after exposure to infection. Normal human serum, in the form of a blood transfusion, is valuable in the treatment of septicæmia and other highly toxic conditions and also for effecting hæmostasis in certain hæmorrhagic disorders.

For prophylactic purposes tetanus and gas-gangrene antitoxins are indispensable; the earlier they are administered the more consistent is the result. Opinion is divided upon the value of using diphtheria antitoxin and scarlatinal antitoxin for prophylactic purposes. It is a temptation to administer these serums to a community such as a school when a sporadic case of the disease occurs. The immunity so conferred lasts only a few weeks and rarely eliminates the cause of the trouble, namely a carrier; thus the disease usually breaks out again quite soon.

Abuses.—Many would class the prophylactic use of diphtheria and scarlatinal antitoxins as an abuse. It is an abuse to submit a patient to the risk of the discomforts of serum sickness unless there is a reasonable chance of the serum doing good. Admittedly no real harm is often done by administering a therapeutic serum simply on empirical evidence in many acute bacterial infections; this point is sometimes used as an argument for employing pneumococcal serum in every case of pneumonia. But with the speed of modern transport it is possible to obtain a bacteriological report or a specific type result almost as quickly as the serum itself, and it is as well to have some justification especially if making an intravenous injection.

ACTIVE IMMUNIZATION (VACCINES AND OTHER ANTIGENS)

Vaccines may be used prophylactically or therapeutically. With active immunization the subject must be in a sufficiently good state of health to respond to stimulation without danger.

A person who is toxic and ill is, as a rule, unfit for vaccine treatment. For the purposes of treatment individuals may be described as either *allergic* or *indolent*. The indolent type is the more easy to deal with; they have relatively little reaction to the average dose of a vaccine whether this is used for prophylaxis or for treatment; many will tolerate extremely large doses. The allergic type is highly sensitive to minute doses and the immunity of such persons is readily depressed by attempting to treat them on orthodox lines. Such persons require desensitization rather than immunization for it is well recognized that the deleterious effect of a bacterial infection is often due not to lack of immunity but rather to a hypersensitivity to amounts of toxic products so small that an ordinary person would be quite unaffected. An obvious example is bacterial asthma but many minor grades of mild chronic illness belong to the same category. The difficulty is to identify this allergic type. The first dose of a vaccine is always an experiment. Subsequent doses are gauged by the reaction to the first. It is therefore a sound rule to make the first dose extremely small, even homœopathic; by so doing the sensitive subject is identified and the future course of treatment defined.

Prophylactic vaccines are usually given in two or three doses. It is wiser to make the number of doses three or four so that the first dose given may be about one-tenth of that which is recommended; subsequent doses are then gauged by the reaction to the first dose. The same principle applies to therapeutic vaccines. Whereas the initial dose of most therapeutic vaccines for the average person is from 1 to 5 million organisms, it is much safer to divide this dose by ten or even more in the case of frank allergic disease. And there is considerable advantage in giving the doses in pairs of the same size rather than increasing at each inoculation. One dose sometimes sensitizes a patient and there is less reaction to a second dose of the same size than to a larger dose however small the increase.

A point frequently raised is the relative merits of stock and autogenous preparations. Sometimes there is no choice as for example with prophylactic vaccines or when the infect-

ing organism cannot be obtained in pure culture. As a general rule an autogenous preparation is better tolerated than a stock one, but it may not necessarily be as efficient an antigen. Ordinary vaccines are by no means an ideal antigen, because all are definitely toxic. But there is no sound evidence to show that so-called detoxicated vaccines are equally antigenic. Sensitized vaccines are theoretically an approach to the ideal.

Uses.—The prophylactic value of typhoid, paratyphoid, cholera and plague vaccines is unquestioned. Pertussis vaccine is considered a useful prophylactic but valueless in treatment. Anti-catarrhal vaccines have a limited use in selected cases; to some, the allergic, they do harm, to others they do no good and to the remainder they are highly successful; their value can only be estimated by personal trial bearing in mind the necessity for giving a minute preliminary test dose and of making a routine examination of the nose and pharynx for anatomical or pathological abnormalities. Of other methods for prophylactic active immunization the value of diphtheria alum toxoid and diphtheria toxoid antitoxin floccules is proved beyond doubt; active immunization against scarlet fever with streptococcal toxin is unfortunately neither so permanent nor so certain.

For therapeutic purposes vaccines have a value, variable from patient to patient, in furunculosis, acne, bronchitis, asthma, gonorrhœa (especially the metastatic manifestations) colitis, rheumatoid arthritis, urinary infections, and a number of other chronic infective diseases. Vaccines are also commonly used in the treatment of the fashionable and elusive state of chronic ill-health known as "intestinal toxæmia"; for this condition they provide a metabolic stimulus, probably non-specific, and a treatment which has a possible rational basis and which appears to be psychologically if not therapeutically effective in the neurotic type of person in whom such symptoms are common.

Local staphylococcal lesions, especially boils and styes, are now treated with staphylococcal toxoid or with a combination of toxoid and vaccine, preferably autogenous. The dose requires to be carefully graduated and, because the immunity is not long-lived, a small maintenance dose should be given

once a month over a long period. Toxoid is useless, even dangerous, in the treatment of generalized staphylococcal infections or with extensive and deep-seated lesions such as osteomyelitis. Tuberculin treatment has a definite place in the treatment of tuberculosis; the initial dose must be extremely small, the increases very gradual and the course continued over months or even years.

Vaccines may be used for their non-specific effect in diseases in which fever and stimulation have been found to have a valuable action. Thus typhoid vaccine may be given intravenously in chronic rheumatoid arthritis.

Abuses.—Vaccine therapy is less abused now than it was twenty years ago when it was believed that it was a valuable procedure in almost any infection. The limitations of this form of treatment are now more generally realized and, though it is usually worth while to make a trial of the method in many chronic infections, it is unwise ever to promise dramatic results. The worst abuse is to over-stimulate the patient, hence as a general rule it is risky to use a vaccine in acute toxic diseases. Great harm may also be done by overdosage, even in healthy subjects, more especially in those who are ill. Rather than follow a theoretical schedule of dosage it is infinitely preferable to rely on one's own judgment. If a given dose is not well tolerated it is best to return to a dose which is and to make no attempt to increase beyond this point. Give instead a series of tolerated doses however small. Much better effects are obtained thus in those who are sensitive. Any general reaction in the form of depression, fatigue, urticaria or especially a rise in temperature is an indication of overdosage; such general symptoms are much more important than simple localized pain which is largely concerned with the luck of the needle prick. Local skin reactions, bruising and intense redness, are also danger signals. Active immunization when carried out on these lines occupies a long period of time and calls for much patience on the part of the doctor and the patient. The process cannot be hurried nor can it be regulated efficiently without considerable judgment.

THE USE AND ABUSE OF EXTERNAL APPLICATIONS

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THERE are many forms of medical treatment which can correctly be described as external applications. A drop of atropine in the eye, a poultice upon the chest, a mustard plaster on the epigastrium, or a dressing of castor oil and zinc ointment for a bed-sore—all of these are clearly external applications, and have a right to be so called. For the purpose of this article, however, and to avoid overlapping others in the series, it is proposed to restrict the phrase to those medicaments which are applied to unbroken skin, and to omit those which are used in the treatment of skin diseases or are applied to mucous membranes. With this restriction in mind, let us ask ourselves what is the good of external applications? What purpose or purposes do they serve? I would like to suggest four definite functions, though in actual practice it will be found impossible to make so clear a line of distinction between them. They are as follows:—

First, the conveyance of certain drugs, such as mercury and belladonna, which can be absorbed through normal skin. Secondly, the relief of acute local congestion by the contraction of peripheral blood-vessels. Thirdly, the relief of deep congestion by the dilatation of peripheral blood-vessels and the reflex withdrawal of blood from the deeper congested areas. Fourthly, the alleviation of neuralgic pain by direct analgesic action upon inflamed or irritated sensory nerves.

If these functions are clearly borne in mind, a great deal of empirical and indiscriminate prescribing of liniments and poultices will be avoided, and a rational use made of a valuable form of therapy.

THE CONVEYANCE OF MEDICAMENTS

In spite of all that has been said to the contrary, there is a widespread belief that numbers of useful drugs can be *rubbed into*

the system—hence the popular use of camphorated oil on bronchitic chests, of turpentine stupes on distended abdomens, and of opium lotion upon sprained joints. In such cases the benefit which may undoubtedly follow is probably not due to the drug at all, but to the relief of pain and congestion resulting from either the heat, the cold or the friction produced in the course of its administration. There are, however, at least three drugs which are capable of absorption through normal skin, and which can profitably be administered, under certain conditions, as external applications. They are mercury, belladonna and iodine.

Mercury can be conveniently administered in the form of an inunction, and is often so used in the treatment of syphilitic infants, the ointment being applied to the baby's binder. It also possesses a distinct therapeutic value in the treatment of chronic inflammation of bursæ and joints. In such cases it may either be applied by the direct inunction of ung. hydrargyri around the affected part, or it may be administered in the form of Scott's dressing by the use of strips of lint, covered with the compound mercury ointment, held firmly in position by strips of adhesive strapping. Whichever method is employed, accurate dosage should always be observed in deciding how much ointment to rub in or apply, as otherwise symptoms of mercurial poisoning may follow. At the same time, the tendency of the ointment to produce an irritative dermatitis, if left too long in contact with any particular area of skin, must be carefully borne in mind.

Belladonna, when used as an external application, is generally administered in the form of the liniment or the plaster. The former of these is chiefly analgesic in action, and will be referred to again in the concluding section of this article, but the plaster is the common employed vehicle when absorption of the drug by external application is desired. In this form it is popularly used as a means of stopping lactation in a mother who is weaning her child, and is also of value in the treatment of chronic mastitis. Another purpose for which it is frequently prescribed is for application to the precordium in cases of acute pericarditis or cardiac disorders associated with marked

palpitation. As in the case of mercury, it must never be forgotten that its excessive use may produce toxic symptoms; this warning is specially important when any preparation of belladonna is being applied to the breasts of a mother who is still suckling her child.

Iodine is mainly employed in the form of the tincture or pigment, in which case its function as an external application is largely antiseptic or counter-irritative. When absorption of the drug by external means is desired, it is best given in the form of an ointment, of which the most popularly used are ung. iodi denigrescens and iodox. These preparations are particularly useful when dealing with subacute forms of inflammation, such as inflamed lymphatic glands, chronic bursitis, tenosynovitis and arthritis, their action being increased if some form of heat is applied at the same time. Excessive use will often produce blistering of the skin, in which case the application should be temporarily stopped, or symptoms of iodism may appear. No preparation containing iodine should be applied to abraded surfaces. The application of iodine in cases of enlargement of the thyroid gland—a favourite mode of treatment in former days—has little to recommend it, owing to the uncertainty as to how much iodine—if any—is being absorbed. In such cases internal administration is obviously preferable.

THE RELIEF OF ACUTE LOCAL CONGESTION

It is probable that the most efficacious form of treatment of acute local congestion is simply the application of cold in some form or another. Every pugilist, or non-pugilist, for that matter, is well aware of the value of cold applications when treating a potential black eye; but to be effective it is essential that such an application should be administered early, before any large effusion has had time to develop. The value of this form of treatment consists in the fact that the peripheral blood-vessels contract on exposure to cold, with the result that far less serum is poured out into the damaged tissues than would otherwise be the case, and less local congestion therefore occurs. If, as so often happens, no treatment is available

until a large swelling has already developed, it is of very little value to apply cold at that late stage; in such a case hot applications will be found far more effective in promoting rapid absorption of the effusion.

The most convenient means of administering cold applications is either an ice bag or an evaporating lotion, though the use of ointments or liniments containing menthol has a somewhat analogous function, owing to the sensation of cold to which it gives rise. A stream of ice-cold water poured over a burnt finger; a lump of ice applied to a rapidly increasing hæmatoma; or the application of evaporating lotion to a sprained wrist or ankle—all of these are useful examples of the relief of acute local congestion by the external application of cold. To be of value, however, such applications must be used early, they must be constantly changed so as not to become dry or warm, their use must be continuous, and they must not be unduly prolonged. It is also well to remember that this form of treatment is far more efficacious in acute congestion of traumatic origin, than in infective or inflammatory conditions.

THE RELIEF OF DEEP CONGESTION

In the treatment of deep congestion in any part of the body, whether in muscles, bones, joints, thoracic or abdominal viscera, external applications play an important part. Poulitices and plasters, pigments and liniments, counter-irritants, rubefacients and vesicants—each has a function to fulfil. Once again it is important to understand the particular effect which it is wished to produce in treatment, if the practitioner is to avoid using these various applications quite empirically, or abusing them altogether. It is necessary to consider the particular physiological effect produced by each of them, the means by which it can relieve deep congestion, and the conditions under which it can advantageously be administered.

(a) *Poultices and packs*.—The application of moist heat to the surface of the body is followed by the dilatation of the cutaneous vessels and the reflex withdrawal of blood from the deeper parts. Moist heat can be applied continuously by means of

fomentations, packs or poultices, the advantage of poultices (or of packs composed of mud, peat or of China clay) lying in the fact that their specific heat is greater than that of water, and that they therefore remain hot for a longer time than an ordinary fomentation. Poultices and packs are of special value in acute inflammatory conditions associated with deep congestion or effusion, as in lobar pneumonia and intra-abdominal abscess; but to be successful they must be correctly applied, the application must be continuous (one poultice not being removed until the new one is ready to take its place), and they must be changed before losing their heat. Linseed poultices are usually made of four parts of crushed linseed and ten parts of boiling water. The mixture should be prepared in a heated basin before a fire, so that the poultice may be kept as hot as possible, the water being stirred the whole time whilst the linseed is being added. The mass must not be too thick, and should be smeared with oil to prevent sticking. The vascular dilatation which it produces on application to the skin may be increased, if desired, by adding one part of mustard to every sixteen parts of linseed, thus obtaining the additional effect of counter-irritation. Mud or peat packs can be made by adding Fuller's earth, peat, China clay, or any special variety of mud to a basin of very hot water, mixing carefully and spreading the mass upon fine muslin. When applied it is best covered with a mackintosh sheet and blanket.

Antiphlogistine or cataplasma kaolini has to a large extent taken the place of poultices or packs, owing to the ease with which it is prepared and applied. It is, however, often rendered ineffective by incorrect methods of application. It should first be heated (in its own container) in a pan of boiling water, until it is considerably hotter than required, thus allowing for the loss of heat during spreading. It should then be laid on thin calico or butter muslin by means of a heated spatula, to a thickness of not less than $\frac{3}{4}$ inch; too often it is spread more like butter on bread! Lastly it should be covered with a thin gauze, and so applied to the skin (with neither vaseline nor oil intervening), being held in position by means of a suitable bandage after being well covered with gamgee tissue or cotton-wool. It

will require changing every eight to twelve hours.

(b) *Pigments and plasters*.—As a means of relieving deep congestion, paints and plasters mostly act by what is commonly termed counter-irritation. This is probably a double effect, the action of the drug producing an analgesic influence upon the irritated sensory nerves, and at the same time giving rise to an acute superficial hyperæmia, which in turn induces the absorption of inflammatory products and with the withdrawal of blood from deeper parts. This form of application is more suitable in the chronic types of local congestion, e.g. fibrositis, chronic tenosynovitis, bursitis and arthritis, than in acute inflammatory conditions, and requires to be repeated from time to time according as the epidermis recovers from each application. The paints usually employed for this purpose are either liquor iodi fortis (10 per cent.) or liquor epispasticus (blistering fluid), and are mainly used in cases of chronic synovitis and bursitis, or in chronic neuritis; in this last affection the paint is applied as nearly as possible over the trunk of the nerve.

The plasters most commonly used for purpose of counter-irritation are either emplastrum sinapis (mustard plaster), emplastrum calefaciens or emplastrum cantharidini (blistering plaster). Mustard plasters should be prepared by mixing mustard with warm vinegar or water and adding flour to modify its action, equal parts of mustard and flour being used for adults, or one part of mustard to three of flour in the case of a child. This mass is spread on stout paper covered with muslin or linen, and a second layer of linen is laid upon the mixture so as to intervene between it and the skin. Such plasters are useful in the treatment of acute abdominal pain; of severe headache (in which case they are either applied to the forehead or to the nape of the neck); or of acute neuralgia.

If blistering plaster is employed it must be remembered that the emplastrum cantharidini is ten times as strong as the emplastrum calefaciens and, if left too long in position, acts as a powerful irritant to the kidneys, owing to the absorption of cantharidin. It should therefore never be used in cases of inflammation or congestion of the kidneys, and should always

be removed as soon as a blister has formed. It is one of the most potent of all counter-irritants and is of great value in cases of pleuritic or pericardial pain, deep neuritis, and arthritis with effusion.

(c) *Stimulating liniments and rubefacients.*—There are numerous external applications in common use which have the effect, when rubbed vigorously into the skin, of producing redness and warmth. This combination of hyperæmia and heat has a definite analgesic effect and at the same time assists both in promoting the absorption of local effusions and inflammatory products and in relieving deep congestion. Camphor, capsicum and turpentine are the most common ingredients of these preparations, and one or other of them is to be found in almost all the popular embrocations and stimulating liniments. They are of particular value in chronic forms of inflammation affecting the skeletal system, such as chronic fibrositis, lumbago, and myalgia. Turpentine is also largely used in the form of hot stupes, which are specially useful in cases of abdominal distension and colic. It must always be remembered, however, that turpentine is an irritant to the kidneys and must not therefore be employed in situations where it could be absorbed in excess.

THE ALLEVIATION OF NEURALGIC PAIN

In the treatment of acute neuralgia and neuritis the external application of analgesic drugs is of distinct service. Such drugs are usually administered either in the form of paints or of liniments. In the case of the more superficial types of neuralgic pain, such as is met with in facial neuralgia, brachial neuritis, and various neuritic conditions affecting the lower extremity, analgesic paints will often be better tolerated than liniments. The active principle in such paints is usually menthol or methyl salicylate (synthetic oil of winter-green) or a combination of the two. Thus both are to be found in ung. methyl salicyl. co (B.P.C.), and in the various forms of analgesic balm (such as Bengue's balsam, Martindale's methysal balm, Parke, Davis's analgesic balm). These preparations are made in various strengths, the amount of methyl

salicylate present varying from 7 per cent. to 50 per cent.

Other useful forms of analgesic paint are pigmentum chloralis et camphoræ (chloral camphoratum of the B.P.C.), which consists of equal parts of chloral hydrate and camphor; and methyl-aspirodine balm (Martindale), which contains 50 per cent. of methyl-aspirodine. Such paints are all of value in any painful neuralgic or rheumatic condition which is characterised by acute superficial tenderness, and are often found to be more efficacious if warmed before use and painted on thickly.

As an alternative to these paints analgesic liniments may be applied to areas of acute superficial pain, such as are found in cases of acute phlebitis or peripheral neuritis. They are best administered by being thoroughly warmed and then rubbed in liberally and lightly, the affected part being wrapped up loosely in cotton-wool or gamgee tissue. The liniments which are most serviceable for such cases are lin. aconiti oleosum (B.P.C.), better known as lin. A.B.C., and containing equal parts of the liniments of aconite, belladonna and chloroform; linimentum or glycerinum belladonnæ; lin. bellad. c. chlorof. (B.P.C.); lin. chloral. co. (a combination of chloral hydrate, menthol, thymol and camphor, to be found in various hospital pharmacopœiæ); lin. methyl. salicyl. (B.P.C.) or its compound form (which also contains chloral); and Martindale's methyl-aspirodine liniment (a mixture of 25 per cent. methyl-aspirodine with camphor, chloroform and menthol).

For deeper forms of neuralgic pain, such as occur in interstitial neuritis, sciatica, and fibrositis, a more vigorous use of such liniments is often beneficial. In such conditions preparations such as lin. atropinæ (1 per cent.), lin. bellad. c. chlorof., lin. chloroformi of the B.P.C. (containing equal parts of chloroform and camphor liniment) or lin. mentholis (menthol, chloroform and olive oil), well warmed and rubbed briskly into the affected part, will often bring great relief.

THE USE AND ABUSE OF DRUGS IN CARDIOVASCULAR CONDITIONS

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RHEUMATIC HEART DISEASE AND SALICYLATES

ONE of the outstanding personalities of the 19th century was Sir William Gull, who had a long and distinguished career as a physician to Guy's Hospital. When he died he left a large fortune and an even greater reputation as a fashionable physician and a popular teacher, yet he had been regarded as a therapeutic nihilist—one who had no faith in the remedial power of drugs; he was opposed to anæsthetics for which he saw no real necessity, and in Guy's Hospital reports for 1865 there appeared the results of a series of cases of acute rheumatism treated in his beds with mint water. It must be remembered that Maclagan published the discovery of salicin in 1876, and that before this a great variety of ineffectual remedies were used in treating rheumatism. Gull claimed that the results of treatment by mint water were at least as good as those obtained by any other treatment, and that he was enabled to study the natural course of the disease. The cases reported were in hospital for an average period of twenty-nine days, most of them had pericarditis, and all of them were severe cases of acute rheumatism in young adults.

A typical case is that of a groom of twenty-four, who was admitted with swollen painful knees and pericarditis on June 5 and went home "cured" on July 6 of the same year; it is not surprising to read the recommendation that such patients should be re-examined a month or six weeks after discharge to ascertain what cardiac damage had resulted.

A critical examination of this work shows that two errors were committed—the criteria of cure were quite wrong, and an utterly inadequate time was allowed for the treatment of the condition. It is acute rheumatism which is responsible for the bulk of acquired cardiac disease before middle age, and the common mistake to-day is to allow too short a time for the

cure of the carditis so constantly associated with rheumatism in childhood. Months of rest are essential even in moderately severe cases if the best results are to be obtained, and during this period careful nursing is an absolute necessity if the heart is to be really rested. And although there can be hardly anyone now who would suggest that severe acute rheumatism could be cured in a period of less than a month, yet many doctors will allow their patients up in about six weeks. Prolonged rest may be difficult to obtain—the parents and the patients grow tired and impatient at a long convalescence and the constant care necessary to ensure a good recovery, but the risk of cardiac damage as a sequel to too short a rest, and the possibility of permanent invalidism or a relatively early death makes the prolonged rest period well worth adoption. When salicylates were introduced the older physicians said that acute rheumatism was controlled and cured as never before, for the hyperpyrexia, weeks of misery and pain, and the profuse uncomfortable sweats all disappeared. All this is true, and more than this, for the swelling and redness of the joints goes with the pain, the temperature subsides, and the patient feels well. The effects are produced rapidly with adequate dosage and the dosage originally aimed at was ten grains an hour, 240 grains a day. It is astonishing to find that modern therapeutic measures are carried out so half-heartedly that some physicians even doubt the utility of salicylates, and others teach that while salicylates act upon the joints, skin and fever, they have no effect upon the rheumatic process in the heart. There is one pathology of acute rheumatism in joints and pleura, heart and subcutaneous tissues, and, given time and adequate dosage, salicylate medication will modify that pathological change in any tissue.

It is possible to give a child of ten years 240 grains of sodium salicylate every day for months, without any great difficulty or any disadvantage; indeed, the child and the carditis improve on such a dosage. But the child must be kept at rest; must be fed on a low protein diet (at least at the beginning of treatment)—milk, vegetables, fruit, bread and butter; must be given adequate quantities of fluid; must have a daily action of the

bowel; and must take twice as much bicarbonate of sodium—480 grains. The best way to prescribe the salicylate is in doses of 20 grains two-hourly with 40 grains of bicarbonate, some syrup and a flavouring reagent, and as children readily tire of any medicine it is useful to make up two or even three bottles with the same essential ingredients but of different taste and colour. The more palatable it is the better, and the flavour should be changed whenever the patient tires of it. By these means the effects of acute rheumatic carditis can be minimized and cardiac defects may be rendered less severe and less common.

STIMULANTS AND SEDATIVES

There is a tendency, not new, to seek for stimulants to revive, assist or strengthen a defective or failing heart, because it is not generally realized that no drug will confer new powers or develop new qualities in tissues, although a remedy may evoke latent potentialities or modify functions. This tendency accounts for the large number of preparations of so-called stimulants on the market to-day, and it is safe to say that their use is generally incorrect in cardiac cases; indeed, as a rule organic cardiac defect benefits more from a sedative than from any stimulant.

Cardiac patients can be roughly divided into two great classes (1) those with organic cardiac defect, and (2) those who have no organic disease, but are unpleasantly aware of or afraid of their hearts—the functional cardiacs. In neither of these classes are stimulants indicated. The former need rest and repose, mental as well as cardiac quiet, and are improved by sedatives. Astonishing benefit often follows a period of rest in bed, or even a change of habit which allows longer rest periods or less work, worry, and responsibility, and the use of small doses of some sedative helps by predisposing to mental quietness. The importance of a talk on general principles—hours of sleep, amusements, food and drink, must not be forgotten, and may usefully be followed by a small daily dose of phenobarbitone or some similar preparation.

The second group certainly will not benefit from any agent which will increase the force of the heart beat, and after

reassurance their chief need is likewise some sedative to make them less conscious of cardiac action. Part of the effect of mild long-continued thyrotoxicosis is produced by the general restlessness that it induces, and it may be that some of the results claimed for complete thyroidectomy in heart failure could be obtained by less drastic means of ensuring quietness.

When a patient discovers a new hill, or finds himself breathless after some insignificant effort, it is the doctor's duty to inquire into the daily life and routine of the patient so that any necessary adjustments may be made—it may be necessary to advise a temporary rest or a complete revision of activity and a retirement from business. The advice given will depend upon the assessment of the gravity of the cardiac condition, and the mental, physical, and financial state of the patient. The important point is that it is wrong to allow any such patient to carry on with his job unchanged in the hope that something (a stimulant) may help his failing heart to adjust itself to the daily call made upon it. Such a policy merely postpones effectual treatment, perpetuates the cardiac difficulty, and directly contravenes the great maxim that early treatment gives the best results.

ACUTE PULMONARY ŒDEMA

Acute pulmonary œdema is one of the most dangerous and alarming of medical emergencies, and the condition calls for prompt and energetic treatment. The attack usually comes on at night, sometimes after an unwonted exertion or too large a supper, or as a sequel to a hot bath, or like a bolt from the blue for no ascertainable reason. The symptoms are breathlessness, with copious frothy, white or blood-stained expectoration. There may be palpitation, but as a rule the patient feels that suffocation is his danger. He is intensely distressed both by his fears and his dyspnœa, and, unless the attack is of brief duration and minor severity, he sends for his doctor. The immediate administration of morphine and atropine will produce a rapid amelioration of symptoms and a speedy return to the normal state; but if the attack has lasted rather longer before assistance is demanded, or if some time has elapsed

before the doctor can be obtained, it may be much more difficult to cope with the attack, and even the first attack may prove fatal if untreated. A further measure which is most helpful is bleeding, and this should be resorted to if the patient is cyanosed and the peripheral veins are distended. As a rule, a quarter of a grain of morphine and one-hundredth of a grain of atropine are adequate, but this dose should be repeated if it appears to be ineffectual within twenty minutes of injection. The common error in treating such attacks is to give stimulants such as injections of adrenaline, camphor in oil, strychnine, ether, brandy, or some other reputed cardiac stimulant. One and all are useless and, in as much as they postpone correct treatment, harmful.

RELIEF OF PAIN

Diamorphine or heroin, which is about twice as effectual as morphine in relieving pain, is unsuitable in cardiac cases because it is mainly excreted by the kidney and reduces renal efficiency, although it does not produce constipation. Moreover, the risk of addiction is even greater than with morphine, and the respiratory centre is more powerfully depressed. Morphine is an almost perfect cardiac sedative—it lessens the patient's fears and distress, soothes the cardiac and respiratory centres, and is mainly excreted by the bowel so that renal functions are but little affected. It has the disadvantage of producing constipation. For the dyspnoea and wakeful restlessness of chronic or subacute cardiac failure no sedative is quite so good; it need not be given by injection and often seems to act better when given by mouth; a daily dose sometimes suffices to check cardiac asthma—the “Cheyne-Stokes” paroxysmal dyspnoea of the “cardio-renal” patient. From five to 30 minims of the liquor morphine hydrochloride (30 minims contain $\frac{1}{4}$ grain) with 30 minims of syrup of ginger should be given at night in a small quantity of water, and may be repeated in four hours if necessary.

DIGITALIS

It is difficult to improve upon the directions originally laid down for the use of digitalis by William Withering in 1785.

He used the powdered leaf, giving from 1 to 3 grains twice a day or, if a liquid medicine were preferred, a recent infusion of the powder, infusing a drachm of dried leaves in a pint of water and giving 1 ounce as a dose. Withering wrote:—

“Let it be continued until it either acts upon the kidneys, the stomach, the pulse or the bowels; let it be stopped upon the first appearance of any of these effects, for if it purges it seldom succeeds well. In men of great natural strength, of tense fibre, of warm skin, of florid complexion, or in those with a tight cordy pulse it seldom succeeds but on the contrary, if the pulse be small, feeble or intermittent, the complexion pale, the lips livid, the skin cold, the swollen belly soft and fluctuating, or the anasarous limbs readily pitting, one may expect the diuretic effects to follow.”

There are now on the market many preparations of digitalis; some useful, some expensive, but none of them better than the powdered digitalis leaf. In Withering's day, with the enthusiasm which greets a new remedy, many practitioners gave dangerously large doses, and digitalis became discredited and regarded as dangerous. Now, on the contrary, it is common to find much too small a dose given—5 minims of the tincture three times a day is regarded as a standard dose. The pharmacopœia regards a grain as equivalent to 10 minims of the tincture—so 3 grains equals 30 minims of the tincture, and in cases of heart failure much more may be needed in the first few days of treatment. As a rule, digitalis will not produce obvious effects in less than twenty-four hours, and about 12 grains will generally be needed to secure such effects so that an initial dose of 6 grains, followed by 3 grains daily is not too much to give to a patient with auricular fibrillation, a rapid feeble pulse, and evidence of circulatory stasis, orthopnoea, liver enlargement, œdema of the legs. It is now known that digitalis produces its diuretic effect by acting on the heart and improving the circulation through the kidneys, and that such improvement is most easily secured in cases of auricular fibrillation. There is a tendency to restrict the use of digitalis to such cases. This is an error, for many hearts failing in normal rhythm improve on digitalis, but these seldom require such large doses as the rapid and irregular hearts. A rapid digitalization can be secured by giving $\frac{1}{2}$ mgm. of digoxin ($\frac{1}{120}$ grain) or strophanthin $\frac{1}{120}$ grain or ouabain $\frac{1}{120}$ grain intravenously. Occasionally, strophanthin will act in cases in

which digitalis fails; this is specially in patients who are thyrotoxic, but even here is not common. Since strophanthin is rapidly excreted and has much less prolonged action on the heart, the dose must be repeated often—at least four times a day to maintain adequate effect, and must be given intravenously. German authors seem to have a marked preference for strophanthin and its alkaloids, and look down upon digitalis; it is doubtful if their patients also prefer intravenous to oral medication.

When fibrillation is established, a regular dose of digitalis is essential if the circulation is to be maintained at its best. The dose need not be large, but should be adequate to keep the heart rate below 80 per minute. One of the common errors of treatment of such patients is to omit the digitalis either because the patient feels it is unnecessary or because the doctor, noticing that the pulse when slower is more regular, imagines that the fibrillation has ceased. It is uncommon for digitalis to restore normal rhythm in fibrillation, and it is even less common for digitalis to fail to control the heart rate.

It is not always easy to make a diagnosis in cardiac irregularity, and there are cases of extrasystole in which the cardiac rhythm is so upset that auricular fibrillation is diagnosed and digitalis is prescribed. As a rule, this treatment makes the extrasystoles more frequent and more obvious and distressing to the patient, so that it is a safe rule that when digitalis does not produce an improvement an irregularity is probably not auricular fibrillation.

QUINIDINE SULPHATE

When quinidine was first introduced it seemed to offer a great opportunity for all patients with auricular fibrillation to be restored to normal rhythm, and as a result it was used in a large number of unsuitable cases. It is true that the majority of cases of auricular fibrillation can be converted to normal rhythm by quinidine, but many patients will not maintain the normal rhythm for more than a short time, some need very large doses of quinidine, and a few are definitely worse off in normal rhythm because the heart rate is less controllable by

digitalis. Quinidine treatment should be confined to those patients who have as it were "fibrillated by accident." When the heart is not grossly enlarged, when there is no evidence of gross myocardial defect, then quinidine should be tried if the heart is in auricular fibrillation. There are three risks in the treatment:—(a) That the patient may have an idiosyncrasy to quinine; (b) that there may be a clot in the inactive auricle which will become an embolus when normal rhythm is restored; and (c) that, at the moment when the heart changes rhythm either from fibrillation to normal sequence, or subsequently by a relapse to fibrillation, ventricular fibrillation may occur. This accident is rare. Because of these risks it is well to have the patient in bed under skilled nursing supervision, preferably in a nursing home or hospital. There, the heart rate is controlled by adequate digitalis, and when this is effected a single dose of 3 grains of quinidine sulphate is given. This may be prescribed in a cachet, but a slightly acidulated mixture is preferable and more certain in action. At least twenty-four hours are allowed to elapse to ensure the absence of any intolerance, indicated by headache, diarrhoea, a rash of erythematous type, nausea or dizziness—and then the 3-grain dose is given three times at intervals of two hours. Next day the dose is given five times at two-hourly intervals, and on the fourth day seven times. Thereafter the dose is increased by 6 grains a day, doubling some of the doses so that either 3 or 6 grains are given two-hourly. It is not usually necessary to go beyond 36 grains in twenty-four hours, and indeed it is unwise to do so because such doses are toxic, and cases of auricular fibrillation which require such large doses seldom maintain normal rhythm for long after treatment. A rather smaller dose of quinidine may prove effectual if a preliminary course of an acid salt is given, e.g. ammonium nitrate in doses of 15 grains four-hourly for three or four days before commencing the quinidine. After the restoration of normal rhythm the patient should be kept at rest for a few days and the cachets of quinidine should be given three times a day. Should the irregular action recur, the dose of quinidine should be given two-hourly again, and generally proves

effectual within twelve hours or less.

THE USE OF NITRITES

Drugs play a small but important part in the treatment of angina, a condition which implies a limitation of the patient's capacity and necessitates a routine of life for successful control. The underlying factors must be determined as accurately as possible—psychogenic and digestive as well as circulatory disturbances being investigated and controlled if treatment is to be effectual. For coronary occlusion rest is the great essential, and only those drugs which will ensure this should be used. Pain, which may be agonizing, must be countered by morphine; large doses may be necessary, and the dose may be repeated hourly as long as the patient is conscious and uncomfortable, for the pain is harmful as a cardiac inhibitor and doubly harmful if it causes restlessness too. The usefulness of digitalis is rather doubtful in such a condition unless auricular fibrillation supervenes, and nitrites are generally ineffective. This fact has been used in making the diagnosis of coronary occlusion, for anginal pain usually responds readily to nitrites and when it is continued in spite of nitrites an actual occlusion of a coronary artery should be suspected. The angina of effort may be avoided and eased by the use of vasodilators. Different patients prefer various members of the nitrite group, and some experiment may be necessary to discover which drug is most helpful and the optimum dose. Amyl nitrite acts most rapidly as it is inhaled, but its effect is very profound and the diminution of blood pressure may be too great, especially in those who have raised pressures. Further, the action is of brief duration so that the inhalation is less likely to be useful as a preventive than as an ameliorative. The most generally useful is nitroglycerin—trinitrin in doses of $1/100$ of a grain. The pharmacopœial tabella is of chocolate (5 grains) and contains $1/130$ of a grain. These tablets should be chewed and not swallowed since the absorption from the mouth is faster than from the stomach. Before exertion or some excitement which is likely to produce pain a tablet may be chewed (there are members of parliament who chew a

tablet before they rise to make a speech.) A tablet may cut short an attack of pain, but it must be most strongly impressed upon the patient that it is better to avoid doing those things that are likely to produce the pain, and that the wise patient will so order his life that he does not incur the discomfort and will consider that the pain is a warning that he has overstepped the safety line. The organic nitrates—erythrol tetranitrate and mannitol hexanitrate have similar effects; being relatively insoluble their dose is larger and their action delayed and prolonged.

HEART FAILURE

There is no condition in the whole range of medical treatment which demands greater skill and more resource than the management of the patient with heart failure. Skilful diagnosis may postpone or prevent actual failure, and when failure does appear the early use of effectual remedies may restore the patient to comparative health for prolonged periods. Drugs play no small part in such therapeutic successes, but they must be combined with rest, nursing, and all the measures calculated to secure the co-operation of the patient. Sedatives have their usefulness; digitalis has been mentioned, and there remain a number of diuretics which, by removing fluid from the tissues, lessen the work of the heart, raise the circulation rate, and improve tissue nutrition. Digitalis alone, or combined with blue pill (as Guy's pill) may produce a marked diuresis. It is perhaps worth noting that our forefathers made up pills frequently so that they were fresh and soft, nor did they coat them with an impervious or resistant envelope which delays or prevents their action. So that it is most important to ascertain that any pill ordered is fresh and that the coating is not too hard. A simple acid salt such as ammonium nitrate is a useful diuretic—dose 15 grains, five or six times a day. This is as effective as ammonium chloride or calcium chloride, is not so nauseous, and has the advantage of not raising the body chlorides (usually high in cases of œdema). Urea itself is an excellent diuretic, it is usually prescribed in too small quantities and is useless in doses of less than 10 grammes a day. It is best ordered as 10 grammes with 120 minims of syrup of lemon

made up to 2 ounces for a dose, and taken with water or soda water at meal times, thrice daily. Caffeine, 4 or 5 grains, may be combined with either of the foregoing, or may be prescribed as tea or coffee which everyone knows as diuretics. A cup of either contains about $2\frac{1}{2}$ grains of the alkaloid. It is said that caffeine and its salts are best avoided in restless, sleepless patients, and especially in those with raised pressures, but personal experience has seldom supported such a suggestion.

The most powerful diuretics yet produced are organic mercury compounds. Used in suitable cases and with care, they can produce amazing results—an output of two gallons a day may be achieved. After a preliminary course of ammonium nitrate for at least three days, the selected mercury salt should be given by intravenous injection. None of these salts can be safely used in patients with renal disease, and none should be injected subcutaneously. If intravenous administration is impossible they may be given by deep intramuscular injection. The first of these salts to appear was novasurol in 10 per cent. solution in 2 c.cm. ampoules; it is certainly the most potent and the most toxic. A safer salt, with nearly as good a diuretic effect, is salyrgan, also supplied in 2 c.cm. ampoules. These are German products. Mersalyl, which was recognized officially in the B.P. Addendum 1936, in a 10 per cent. solution can be injected into a pleural or peritoneal effusion and sometimes causes a rapid reabsorption of the fluid. Neptal, also English, said to be safe in renal cases (a statement which is not convincing), is rather less potent, and is used in the same manner. Finally, there are suppositories of neptal and of novurit, each of which is combined with a dose of theophylline. Occasionally, these act surprisingly well, but results are not so striking as those which follow intravenous treatment. Whichever salt may be used, the injection is best made in the morning so that by night the diuretic effect may have diminished and sleep be possible. It will often be advisable to repeat the dose for two or three days, or injections may be given on alternative days for prolonged periods. Some hundreds of injections have been given over periods of as long as five years without deleterious results.

THE USE AND ABUSE OF DRUGS IN DISORDERS OF THE BLOOD

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AT one time all kinds of anæmia were treated on the same general lines, with fresh air, iron and arsenic, and perhaps transfusions of blood. To-day specific treatment is available for certain types and diagnosis is the first essential. Unless the presence or absence of anæmia is beyond doubt, the hæmoglobin content of the blood should be determined using, for example, a hæmoglobinometer of the Sahli type. This simple but important step will avoid error in patients whose anæmia is masked by a ruddy or sunburnt complexion, or who, although distinctly pallid, have no anæmia whatever. A hæmoglobin value below 70 or 80 per cent. of normal without obvious cause should be regarded, not as an indication for immediate indiscriminate therapy, but for adequate investigation. Once treatment has been started the blood-picture may be obscured. Diagnosis based on blood smears alone is frequently erroneous: not only accurate blood-counts and other hæmatological findings, but sometimes details of diet, gastric analysis, and a search for hidden bleeding or infection are necessary at this stage. As a result of this the opportunity for a striking therapeutic result may be found or the practitioner may be faced with a disease from which no recovery can be expected. Accurate diagnosis in the beginning will often save the patient needless transfusions, or avoid the use of expensive liver preparations when perhaps only iron is required. Routine examination of the stools for occult blood sometimes leads to the discovery of an unsuspected lesion in the stomach or bowel.

Observations of the response to treatment is in itself an important investigation. In anæmias of the "deficiency" groups the adequacy of treatment may be gauged by the height of the reticulocyte peak and the rate of increase of red

blood-cells and hæmoglobin. Moreover, if in the absence of gross infection a megalocytic hyperchromic anæmia fails to respond to liver extract of known potency, even when massive doses are injected, pernicious anæmia can be excluded. During the remission of pernicious anæmia a fall in colour index or cell size may indicate the necessity for iron. In mild hypochromic anæmias, once the cause has been established, detailed observation of the response to iron is often unnecessary, a hæmoglobin estimation once a week being sufficient. In anæmias not belonging primarily to the deficiency groups, liver extract and iron have no effect whatever unless deficiency of hæmopoietic material exists as a complicating factor. In doubtful cases the administration of these substances separately under controlled conditions may constitute a useful therapeutic test.

ANÆMIA DUE TO BLOOD LOSS

Elimination of the blood loss is obviously fundamental. For severe acute hæmorrhage the immediate transfusion of 500 c.cm. of blood is the best method of treatment. The immediate effects, however, of sudden hæmorrhage are due to diminished blood-volume and may be temporarily overcome by the infusion of normal saline, isotonic glucose, gum saline, or plasma. The intravenous drip-method may be used when large quantities of blood or other fluid are required, for example, as a prelude to operation. Blood regeneration after acute hæmorrhage is not necessarily hastened by hæmatinics but, if recovery is delayed or hypochromia develops, iron should be given. The anæmia of chronic blood loss is considered under the heading of hypochromic anæmia.

ANÆMIAS DUE TO INCREASED BLOOD DESTRUCTION

The treatment of anæmia due to blood destruction lies in removing, whenever possible, the particular cause. The agent to be eliminated may be extrinsic: either chemical (lead or nitro compounds) or infective (streptococci, *B. Welchii*, malaria). In the acute hæmolytic anæmia of Lederer transfusion is the treatment indicated. Removal of the spleen is of great value in congenital hæmolytic jaundice. Splenectomy

may also be beneficial, especially if the organ is large, in acquired hæmolytic jaundice and other chronic hæmolytic anæmias of unknown origin. Transfusion is a measure to be adopted with extreme caution in chronic hæmolytic anæmias, owing to the frequency of dangerous reactions. Since in hæmolytic anæmias the materials required for building red blood-cells and hæmoglobin are largely conserved, the administration of liver or iron is not usually necessary.

ANÆMIAS DUE TO SPECIFIC NUTRITIONAL DEFICIENCY

Under this heading are included anæmias associated with or due to lack of (i) substances effective in Addisonian pernicious anæmia and related macrocytic anæmias, (ii) iron, (iii) vitamin C, and (iv) thyroxine. None of these substances has a detectable effect upon blood production unless there is a lack of such substances available within the body: their action is specific and not one of "stimulation" of the blood-forming organs. Deficiency of substances necessary for blood formation may arise from:—

(1) *Inadequate intake of certain food substances.*—A diet deficient in Castle's extrinsic (food) factor is an outstanding feature in the etiology of tropical macrocytic anæmias, and may accentuate the lack of hæmopoietic material in other nutritional macrocytic anæmias including the Addisonian (pernicious) type. In hypochromic anæmias the diet is frequently deficient in food iron.

(2) *Inability of the secretions of the gastro-intestinal tract to elaborate from food factors material necessary for blood formation.*—In Addisonian pernicious anæmia there is deficiency or absence of Castle's intrinsic (gastric) factor, which normally reacts with the extrinsic (food) factor leading to the formation of a substance necessary for the maturation of the red blood-cells. Lack of this or allied substances is probably responsible for the lesions found in the nervous system, tongue, and elsewhere in this disease. The gastric factor, which may be an enzyme, is secreted chiefly by glands in the pyloric end of the stomach and the upper intestine. The food factor is found in muscle,

meat, autolysed yeast (marmite), wheat germ, rice polishings, eggs, and possibly tomatoes. It has not so far been identified with any known portion of the vitamin B complex. Whereas the gastric factor is thermolabile, the food factor withstands autoclaving at 120° C. for five hours. The material resulting from the interaction of these factors is easily destroyed by heat, but is finally stored in the liver and elsewhere in a relatively thermostable form.

(3) *Defective absorption of materials required for blood formation.*—

This may result from improper mastication, gastric achlorhydria, gastrectomy, gastro-enterostomy, gastro-colic fistula, intestinal stenosis or anastomoses, chronic diarrhoea, idiopathic steatorrhoea, sprue, and infestation with certain intestinal parasites.

(4) *Interference with the storage or utilization of blood-building factors* after they enter the blood-stream has been suggested as a cause of the anæmia sometimes found in association with cirrhosis of the liver.

I.—*PERNICIOUS AND RELATED MACROCYTIC ANÆMIAS*

Mammalian liver and stomach are the sources of active principle chiefly used. If oral therapy is employed, equally good results can be obtained with either liver or stomach preparations, provided that the total intake of potent material is sufficient. Sometimes, however, the bulk of material required is greater than the patient can tolerate. This is frequently the case with cooked or raw liver, kidney or brain, the use of which in the treatment of pernicious anæmia is now rarely necessary or desirable. The adequate treatment of pernicious anæmia with oral liver extracts is expensive. This fact, and failure to appreciate that the finished product has considerably less potency than the amount of liver from which it was derived, often results in dangerous underdosage. The factor in gastric tissue is readily destroyed by temperatures well below boiling point; cooked stomach is valueless, and the preparation of desiccated stomach demands great care if inactivation is to be avoided. It is undesirable to use such products unless before distribution each batch has been tested on cases of pernicious anæmia in relapse. In addition to the

intrinsic factor desiccated stomach contains some extrinsic factor, and is therefore effective even if given on an empty stomach. Its effect, however, can be enhanced by the simultaneous administration of additional extrinsic factor: 12 gm. of marmite is sufficient for this purpose. The temperature of any vehicle used for the administration of desiccated stomach should not exceed 65° C. The gastric factor is present in greatest concentration in the pyloric part of the stomach, and a saving in bulk can be attained by desiccating this area instead of the whole stomach. When gastric juice and liver are incubated together a striking increase in potency results, apparently from the interaction of the gastric intrinsic factor with extrinsic factor which is present in the liver. This discovery is utilized in certain commercial mixtures of liver and gastric tissue, which have the advantage of small bulk.

Most if not all liver extracts contain abundant quantities of extrinsic factor, and the addition of yeast extract or other sources of the vitamin B complex to certain commercial products is not a desirable procedure. The use of proprietary mixtures of liver extract and iron is to be deplored. As a rule neither ingredient is present in adequate amount, and in the unlikely event of both being required it is cheaper and more efficient to prescribe them separately. In a patient not definitely known to have pernicious anæmia the blood picture may be obscured and it may be impossible to say whether any improvement which follows is due to the liver extract or to the iron. If the mixture is discontinued and the patient should happen to have pernicious anæmia, a relapse will sooner or later occur, which may be accompanied by severe spinal cord degeneration. On the other hand the administration of liver extract and iron for hypochromic anæmia when only iron is required involves needless expense.

Marmite (autolysed yeast), wheat germ and beef muscle are hæmatopoietically effective only after interaction with the gastric intrinsic factor. Since the amount of intrinsic factor in a patient's gastric juice cannot be predicted, autolysed yeast and other sources of extrinsic factor, although sometimes effective, are not suitable for routine treatment in pernicious

anæmia. Wills finds autolysed yeast a valuable remedy in tropical macrocytic anæmias, and a variable degree of response may occur in the macrocytic anæmia of sprue and of idiopathic steatorrhœa. Whether or not autolysed yeast will successfully replace liver or stomach preparation in any given patient can only be determined by experiment.

Parenteral liver therapy has many advantages over oral treatment. Deficient intake dependent upon nausea, vomiting, or distaste for the materials are overcome, and variations in effect due to absorption from the alimentary tract are eliminated. The amount of liver extract which when injected will produce a maximal response is only one-thirtieth or less of the quantity which is required when the material is taken orally, so that considerable economy is effected. Most patients prefer an injection of liver extract every one to four weeks to the daily ingestion of liver or stomach preparations. In severely anæmic patients there is no method to compare with parenteral liver therapy, the response to which begins earlier and is more certain than with oral treatment. Intramuscular injection is also the most satisfactory way of administering large quantities of potent material such as may be required in the presence of complications or for the treatment of subacute combined degeneration. In Table I are shown the average amounts of various therapeutic agents maximally effective in producing reticulocytes in average cases of pernicious anæmia. There is so much variation in response to a given dose that the amounts of material suggested should be taken merely as a rough guide: each patient must be treated according to his individual needs. In a severely anæmic patient transfusion is undesirable unless when at rest in bed, air hunger and signs of circulatory failure are present. Ordinarily 30 to 60 units* of an effective liver extract should be injected intramuscularly either at once or in divided doses over a period of two or three days. Although in the average patient even 10 units will be sufficient to bring about rapid improvement and an increase of red blood-cells and hæmoglobin continuing for two or three weeks, the possibility of inhibiting factors such as infection, nitrogen reten-

* For definition of unit see Table I.

tion or arteriosclerosis cannot always be excluded, and it is wise to give considerably more than the minimum deemed necessary. The effect of the treatment will be gauged by the reticulocyte response, the rate of increase of red blood-cells and the occurrence of subjective improvement. If the response is poor still larger amounts must be given and repeated as often as necessary. After the first ten to fourteen days it will usually suffice to give 10 units of the extract once a week. In less severely anæmic patients an initial injection of 20 units followed by 10 units every seven days is often enough to bring about complete remission. Should it be desired to substitute oral for parenteral therapy at this stage suitable preparations may be administered in the daily amounts indicated in Table I.

Liver extracts should be injected intramuscularly into the upper and outer quadrant of the buttock, care being taken that the needle is not in a vein. Mild reactions such as transient flushing or giddiness or local pain and swelling are not very uncommon. In rare instances when a patient becomes hypersensitive and shows urticaria or even bronchial spasm ("asthma") it may be desirable to give the material in diluted doses at intervals of twenty to thirty minutes, beginning with a few minims intradermally.

TABLE I.

Approximate daily amounts of substances necessary to produce Maximal Reticulocyte Responses in Pernicious Anæmia.

	Original wt. of raw material. (gm.)	Prepared wt. or volume.	Route of administration.
Liver or kidney - - - -	500	400 gm.	oral
Desiccated hog stomach - - -	250	30 gm.	oral
Liver-stomach preparation - -	20	4.5 gm.	oral
Liver extract:			
Precipitate 95 per cent. alcohol (fraction G) - - - -	600	27 gm.	oral
Extract, hepatis liq. B.P. - -	600	75 c.cm.	oral
Dilute solution of fraction G -	10	2 c.cm.	Im.
Concentrated solution of fraction G (commercial) - - - -	20	0.6 c.cm.	Im.
Purified Dakin and West fraction -	—	0.1 c.cm. (7.5 mg.)	Im.

Im. = Intramuscular.

The approximate dosage for substances given at greater than daily

intervals can be calculated by multiplying the number of days elapsing between successive doses by the daily dose given in the table. The daily dose as defined in this table is also referred to in the text as a "unit."

Slightly modified from the table by Minot, G. R., and Castle, W. B.—*Lancet*, 1935, ii, 319.

The injection of 10 units a week, or the daily injection of one unit of a suitable preparation should be continued not merely until the blood count is within the normal range, but until the red blood-cells are normal in all respects, with a colour index of one or less, and a cell size below 100 cubic micra. In some cases iron is necessary to overcome a tendency to develop hypochromia and microcytosis.

Before any reduction of dosage is considered the patient should have been relieved of all symptoms referable to a deficiency of active principle, including such neurological manifestations as are not the result of irremediable damage to the nervous system. The persistence of minor neural symptoms such as numbness and tingling in the extremities is an indication for the continuation of not less than 10 units a week for at least six months, and until the symptoms have remained stationary for three months or more. When there are no neural symptoms it is usually possible to reduce the original dose to approximately one half, e.g. the ingestion of half a unit of material daily, or the injection of 10 units once a fortnight. After six months, if there are no clinical or hæmatological evidences of insufficiency, a further reduction of dosage may be attempted. Attempts to trace out minimal maintenance doses leave the patient with little reserve against intercurrent infections and other possible complications which increase the need for active principle. Relapses in these circumstances may be infrequent and, in respect to the degree of anæmia, mild but the risk of spinal cord degeneration is nevertheless great. To avoid this danger it is advisable to continue permanently and without interruption to give doses of potent material in excess of the amounts required to maintain a normal blood picture. The occurrence of any symptom which might be attributable to deficiency of active principle such as loss of well-being, loss in weight, anorexia, sore tongue, digestive disturbances, or paræsthesiæ, or of symptoms such as dyspnœa directly referable

to anæmia should be at once investigated, so that if necessary the dosage of potent material may be increased.

It is probable that more potent material is required to improve or arrest the progress of lesions in the nervous system than to supply the needs of the erythron. It has been suggested that subacute combined degeneration in pernicious anæmia is due to deficiency or poor utilization of vitamin A, vitamin B₁ or iron, but the results obtained therapeutically with these substances have been disappointing. There is not any conclusive evidence that any material lacking the characteristic effect of liver upon the hæmopoiesis in pernicious anæmia can arrest the progress or influence the course of subacute combined degeneration. Up to the present, tests with liver extracts prepared in a number of ways have failed to demonstrate any lack of parallelism between hæmopoietic potency and neurological effect. The highly-purified material obtained by the method of Dakin and West has proved to be at least as effective in subacute combined degeneration as less pure extracts made in other ways. This suggests that the hypothetical cord factor, if not identical with the hæmopoietic liver principle, must at least be allied to it chemically.

Provided adequate amounts are administered the results obtained in any given case of pernicious anæmia and subacute combined degeneration will probably be much the same whether the potent material is administered by mouth in the form of liver or stomach preparations or by injection as liver extract. On the other hand, adequate doses of material are administered more easily and with greater certainty by injection, and the percentage of failures is correspondingly less. It is advisable to inject 20 to 60 units of liver extract weekly for at least six months, and afterwards for as long as neurological improvement continues. The possibility of benefit cannot be excluded until injections have been given for twelve months, but if treatment has been intensive it is rare that improvement begins after that time. If there is no improvement after six weeks on a given dose the amount may be doubled, but in the presence of complications, or to produce arrest of the lesion in cases which are progressing despite treatment, it is doubtful if

there is any advantage in giving quantities in excess of 60 units a week. In uncomplicated cases at least the continued administration of sufficiently large quantities of potent material will prevent further spread of the disease even if it is extensive and of long standing.

In cases of relatively short duration, when difficulty in walking has been present for less than two years, there is often remarkable improvement in neurological symptoms and signs. Patients with severe paraplegia and incontinence of urine may recover completely their ability to walk and even return to a strenuous occupation. Paræsthesiæ, dysfunction of the hands, sphincter disorders, mental disturbances, inco-ordination and impaired joint sense improve fairly consistently, impaired vibration sense and hypoesthesia less so. Absent knee- and ankle-jerks often return; increased jerks alter less frequently. Extensor plantar reflexes in cases of short duration may become flexor. Some of this improvement may be attributable to the regression of lesions in the peripheral nerves. In the central nervous system regeneration of completely destroyed axis-cylinders cannot be expected, but once the lesion is arrested improved function in the spinal cord may occur due perhaps to greater utilization of uninjured pathways or even restoration of conductivity in some of the less damaged fibres. But however effective specific therapy may be in arresting the nervous lesions and in improving the function of partially damaged neurones, there always remains a residuum of permanently injured fibres in the central nervous system, and in order that full use may be made of uninjured pathways re-education is desirable. As soon as the general condition will allow, the patient should be encouraged to make a daily attempt to walk even although the assistance of two persons or of a special walking chair is required.

When improvement has ceased and the neurological condition has remained stationary for several months, the dosage of potent material may be reduced. In order to prevent extension of the neural lesions it is desirable to use a higher maintenance dose than would ordinarily be necessary. It is important to make a neurological and hæmatological examination once

every few months: the slightest sign of relapse, such as increase in paræsthesiæ, should be met by the injection of suitably large amounts of liver extract.

Macrocytic anæmias related to pernicious anæmia.—Addisonian pernicious anæmia results from a deficiency of the gastric intrinsic factor, but the syndrome of nutritional macrocytic anæmia may arise in certain other ways which have already been enumerated. In pernicious anæmia of pregnancy, tropical macrocytic anæmias, and macrocytic anæmia associated with idiopathic steatorrhœa, intestinal stenosis and anastomosis, pellagra and sprue, the ability to secrete intrinsic factor may be retained. In these conditions a diet rich in sources of extrinsic factor such as meat, wheat germ, and autolysed yeast should be given, which may in itself be sufficient to bring about a remission. Except that it costs less, however, autolysed yeast has no advantage over liver and stomach preparations. Indeed if it is used alone the effect of autolysed yeast must be carefully watched since it will fail whenever the secretion of gastric factor happens to be seriously deficient. When absorption from the intestine is much impaired liver extract should be administered intramuscularly; in sprue as much as 10 to 20 units daily may for a time be necessary to control the diarrhœa. In most of these anæmias there is also an iron deficiency, and iron in moderate doses may be given from the commencement. In pernicious anæmia of pregnancy it may be possible to discontinue therapy a few weeks after parturition, but lifelong treatment is usually necessary in macrocytic anæmias due to sprue and idiopathic steatorrhœa.

II.—HYPOCHROMIC ANÆMIAS

Iron is the essential therapeutic agent for hypochromic anæmia whether this is caused by dietary deficiency, achlorhydria or other gastro-intestinal defect, chronic blood loss or pregnancy. Indeed iron should be regarded not as stimulant to the bone marrow for use in all types of anæmia, but as a building stone in the formation of hæmoglobin, effective only when the anæmia is hypochromic and associated with an iron deficiency. In these circumstances the daily oral administration of optimal amounts of iron usually gives rise to a reticu-

locyte response the height of which is in general proportional to the initial level of red blood-cells and hæmoglobin. Hæmoglobin may not increase at once, but as a rule with maximal amounts of iron the average increase is at the rate of 1 to 2 per cent. per day. The red blood-cell count also increases rapidly and may for a time exceed normal values. Other effects are improvement in appetite, gain in weight, and frequently a diminution of digestive disturbances. Large doses of iron rarely cause constipation, indeed a laxative effect is frequent especially in the early stages of treatment. There may be diminution of size of an enlarged spleen, and reappearance of denuded tongue papillæ, while in cases with koilonychia the spoon-shaped brittle nails may gradually give place to new nails of normal appearance. Menstruation may become excessive when the hæmoglobin is raised above 75 per cent., but the periods usually become normal after a few months if the patient rests in bed at these times. On the other hand iron is said to act almost as a specific in arresting juvenile menorrhagia, nose bleeding and other manifestation of a hæmorrhagic tendency.

Since in human anæmias iron in organic combination is notoriously less effective than inorganic iron, it is surprising that many physicians continue to prescribe preparations containing hæmoglobin or bone marrow. Even more to be deplored is the vogue for administering iron in infinitesimal quantities by injection: Witts found that injections of colloidal iron, iron cacodylate, and certain proprietary preparations give uniformly bad results. Heath, Strauss and Castle have shown that the injection of a suitable 10 per cent. solution of ferric ammonium citrate in amounts not exceeding 200 mgm. a day will produce satisfactory hæmoglobin production, but local pain is frequent and toxic symptoms may occur. If iron cannot be taken orally blood transfusion is probably to be preferred to the injection of iron.

Inorganic iron may be given either as reduced iron, as ferrous salts (sulphate, chloride, lactate), or as ferric salts (ferric ammonium citrate or ferric chloride). Ferrous salts are effective in smaller doses than ferric salts, probably due to

their greater absorbability from the intestinal tract. Average daily amounts which are necessary to secure maximal effects are ferric ammonium citrate 90 grains (6 gm.), ferrous carbonate (Blaud's pill) 60 grains (4 gm.), reduced iron 45 grains (3 gm.), ferrous sulphate 12 grains (0.8 gm.). Digestive disturbances are unusual if iron is taken in divided doses after meals. It is probably wise to begin with a small dose and increase it over a period of days. The use of tablets avoids staining of the teeth, but it is essential that they should disintegrate readily in the gastro-intestinal tract.

If causes for iron deficiency persist, or if no facilities for regular blood counts are available, iron therapy should be continued indefinitely. One-third to one-half of the amounts mentioned above will often be found sufficient; it is not sufficient to advise the patient to resume iron if symptoms recur, as many have no symptoms until the hæmoglobin falls below 40 per cent. and then they will not respond to such a small dose. In many cases the continued prescription of full doses of iron yields more satisfactory results.

In the majority of patients iron needs no supplement: a well-balanced diet containing plentiful amounts of meat, green vegetables and fruit will supply the extra materials needed for hæmoglobin synthesis. Copper is present in sufficient quantities in an ordinary mixed diet and as an impurity in iron preparations but it may sometimes be of accessory value in hypochromic anæmia of infants. Whole liver, aqueous extract of liver, or a fraction of liver precipitated by 70 per cent. alcohol (Whipple's secondary anæmia fraction), but not the fraction of liver effective in pernicious anæmia, have been used with success alone or as an adjuvant to iron in anæmia following hæmorrhage. With ordinary large doses of iron such supplements are not necessary and they are in any case seldom effective in "idiopathic" hypochromic anæmia. Rarely in hypochromic anæmia when iron alone has raised the hæmoglobin somewhat, but failed to bring it to a normal level, the addition of whole liver or one of the extracts referred to may produce a further increase in hæmoglobin. The liver principle effective in pernicious anæmia is useless except in

occasional atypical patients having a complicating deficiency of this factor as well as of iron. When achlorhydria is present, hydrochloric acid aids the absorption of small doses of iron, but with adequate doses of iron the effect of the acid is not appreciable (Witts). The presence of infection, nitrogen retention or low basal metabolic rate may impair the response to iron.

Iron may be given as a prophylactic measure in pregnancy, and to infants born of anæmic mothers. In patients with gastro-intestinal conditions receiving a limited diet, iron may prevent anæmia or relieve it if already present.

III.—ANÆMIA DUE TO DEFICIENCY OF VITAMIN C

Anæmia from this cause which occasionally occurs in scurvy is quickly relieved by the daily administration of several ounces of orange juice or by ascorbic acid itself. Associated deficiencies are sometimes present and may require the use of iron or liver extract.

IV.—ANÆMIA DUE TO DEFICIENCY OF THYROID SECRETION

The mild macrocytic anæmia frequently found in myx-œdema usually disappears slowly along with the other manifestations of the disease under the influence of thyroid administration. Sometimes the anæmia is the result of an associated deficiency of iron or of the principle effective in pernicious anæmia for which appropriate treatment will be required on the lines indicated in preceding sections.

ANÆMIA DUE TO TOXIC INHIBITION, PHYSICAL INJURY OR MECHANICAL INTERFERENCE WITH THE BLOOD- FORMING ORGANS

In anæmia due to benzol, arsphenamine or gold compounds removal of the cause is of course essential. Transfusions are of value, particularly for controlling the hæmorrhagic tendency. Nucleotide preparations or liver extract may be given in the hope of overcoming an associated neutropenia.

In anæmia due to chronic infections iron and a diet rich in animal protein may be beneficial.

In the anæmia of chronic nitrogen retention drugs and

preparations are of little or no value. There is no specific treatment for anæmia due to irradiation: in severe cases transfusion is required and iron and whole liver may help to prolong life.

In anæmia due to mechanical interference with the bone marrow, the result of leukæmia, metastatic carcinoma, myeloma, lymphadenoma, xanthomatosis, or osteosclerosis, little help is to be expected from the use of drugs and preparations. Transfusions and also irradiation may be of temporary value in certain instances.

IDIOPATHIC DISTURBANCES OF THE BLOOD-FORMING ORGANS

In certain congenital anæmias transfusion is beneficial, and iron should be tried. The intramuscular injections of whole blood or human serum is indicated in icterus gravis neonatorum. Transfusion is a supportive measure in Cooley's erythroblastic anæmia and in "aplastic" anæmia. Macrocytic anæmia of liver disease sometimes benefits from whole liver or liver extracts. In "splenic" anæmia large doses of iron are effective in a proportion of cases and should always be tried; the removal of a very large spleen may be necessary for mechanical reasons but rarely has much effect on the anæmia.

OTHER BLOOD DISORDERS

Space allows but brief mention of other blood disorders, in many of which treatment with drugs and preparations plays a minor part. In acute leukæmia transfusion is sometimes helpful in controlling the hæmorrhagic tendency. In chronic leukæmia X-rays and radium are of temporary value. Polycythæmia vera is probably best controlled by irradiation of the long bones and occasional venesection when required. The use of phenylhydrazine to destroy red blood-cells in circulation has little to recommend it. In both chronic leukæmia and in polycythæmia vera treatment with potassium arsenite by Forkner's method may be used as an alternative to irradiation, but the technique is difficult to carry out unless facilities for daily blood counts are available.

In agranulocytosis the first step is to remove any toxic cause such as amidopyrine, gold and arsphenamine. A spontaneous increase of white blood-cells may follow. Injections of nucleotide or liver extract are of value in some instances.

With the possible exception of Timperley, Naish and Clark's material which is under trial, no drug or preparation at present available has proved of significant value in hæmophilia. In primary purpuras pure vitamin C has given disappointing results. The allied vitamin P, not yet generally available, is said to be beneficial in vascular (non-thrombocytopenic) purpuras. Irradiation of the spleen is successfully employed as an alternative to splenectomy in some cases of essential thrombocytopenic purpura. Transfusion or the intramuscular injection of whole blood diminishes the bleeding tendency in many varieties of hæmorrhagic diathesis. The use of injections of snake venom (moccassin) is still in the experimental stage. Russell's viper venom is a useful anticoagulant for direct application to bleeding surfaces, particularly in hæmophilia.

THE USE AND ABUSE OF DRUGS IN LUNG DISEASE

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MEDICINAL treatment, in every department of medicine, has altered greatly in the last thirty years. Whereas the older generation of practitioners were in the habit of prescribing a large number of drugs, in a great number of combinations, in conditions which were frequently not exactly diagnosed, the tendency of the past few years has been to produce synthetic compounds of complex organic constitution, which can be taken in tablet form, and which are commonly prescribed with a much more accurate understanding of the nature of the disease process which is being treated. Although a great deal has been gained, in that certain of the preparations now prescribed have a definite and standardized activity, yet a certain amount has been lost in that the patient of the modern practitioner no longer receives a bottle of physic, usually of nauseous taste, and the more highly prized on that account, which was his portion in days gone by. It must also be remembered that for every standardized drug of known activity, which is at present on the market, there are many more whose highly-sounding names are their chief recommendation. It follows that the modern prescriber is faced with difficulties which differ entirely from those of his predecessor although the fact remains that, with few exceptions, it is impossible to cure disease by means of drugs. Medicinal treatment is of the utmost value in the relief of symptoms, and while adequate measures must be available to achieve this end, yet it must be kept in mind that the treatment of symptoms is only the primary objective, and that the ultimate aim, in the patient's own interest, should be correct diagnosis and accurate prognosis.

In chest diseases, the great majority of conditions which have to be treated are either infective or mechanical in origin,

and in both of these groups drug treatment of any sort is not likely to produce a "cure," but in the last few years valuable methods of special treatment by means of diet, physical exercise, and surgery, have been evolved and the prospect of ultimate recovery, in many conditions, is greatly improved. Hence the necessity for an accurate understanding of the true nature of the condition before treatment is commenced.

COUGH

As symptomatic treatment is therefore one of the chief aims of medicinal therapy, it is desirable first to consider the treatment of the common symptoms of respiratory disease, and of these by far the commonest is cough. Cough may be due to any one of a large number of causes, yet it is disturbing to realize how frequently each and all of these different conditions are treated by the routine "cough mixture." It is clearly unjustifiable ever to prescribe a cough mixture without full examination of the respiratory tract, yet it is a lamentable fact that this is frequently done. The cough which is due to catarrh of the upper respiratory tract is definitely mechanical in origin, in that the larynx is irritated by material which descends from the nasopharynx, and this common cause of cough must logically be treated by a simple alkaline nasal douche, and also by cough lozenges, of which the best is probably troch. sod. bic. Medicines are of little use in this condition, with the exception that a simple linctus will often alleviate the cough. Commonly also, cough is due to bronchitis, and in this field there is an opportunity for the administration of a number of drugs. At the same time, it is astonishing how many different sorts of cough mixtures are prescribed, and how little idea the prescriber often has of the indications for the composition of the appropriate medicine.

It is rarely necessary to stimulate the cough reflex, as patients who are secreting sputum are nearly always in a position to expel it. It follows that such commonly used drugs as ammon. carb. and senega are of comparatively little value. In certain cases of bronchiectasis, in which the patient is gravely debilitated, some assistance may be needed, and some

such mixture may therefore be prescribed. In the great majority of instances, however, the indication is rather to loosen the phlegm. For this purpose there are useful stock mixtures of which the following are examples of proved merit.

R	Sod. bic.	-	-	-	-	-	15 grains.
	Sod. chlor.	-	-	-	-	-	5 grains.
	Spt. chlorof.	-	-	-	-	-	5 minims
	Aq. anisi ad	-	-	-	-	-	$\frac{1}{2}$ ounce

To be taken in half a tumbler of warm water, when necessary.

R	Tr. ipecac.	-	-	-	-	-	10 minims
	Tr. opii camph.	-	-	-	-	-	30 minims
	Syr. tolut.	-	-	-	-	-	30 minims
	Aq. ad	-	-	-	-	-	$\frac{1}{2}$ ounce

The virtues of inhalations are not nowadays sufficiently recognized. For the early stages of bronchitis and in some cases of secondary asthma, great relief may be obtained from these. A useful stock inhalation may be prescribed as follows.

R	Ol. pini	-	-	-	-	-	5 minims
	Mag. carb. levis	-	-	-	-	-	4 grains
	Aq. ad	-	-	-	-	-	60 minims

One teaspoonful in a pint of water at 150° F. To this may be added menthol 1 grain.

It is sometimes found that there is a spasmodic element in the cough. This is fairly common in some of the seasonal outbreaks of influenza, in which the upper respiratory tract is chiefly affected. It is useful in this case to add ephedrine, $\frac{1}{2}$ to 1 grain, to the mixture. In children, spasmodic cough is most commonly a symptom of whooping-cough and in this condition the cough is best controlled by belladonna, which may be given in comparatively large doses. The more severe spasmodic cough of these two diseases is sometimes controlled by the rectal administration of ether in olive oil.

It has for many years been customary to give potassium iodide in chronic chest diseases. There can be no doubt of its value in loosening the cough in most cases of chronic bronchitis and in spasmodic asthma. In such cases it must be remembered that the dose should be small, the optimum for an adult being between 3 and 5 grains, and nothing can be gained by giving

doses larger than these. It has also been a common practice to give potassium iodide to enable the patient with a dry cough to produce sputum for bacteriological examination. Its value in this respect is not so pronounced, although in some cases it undoubtedly produces the required effect and it is therefore always worth a trial. Potassium iodide is also used when it is desired to test the sensitiveness of the patient before giving lipiodol. In such cases it can be given in doses of 10 grains, thrice daily, for two days.

Cough which is the result of mechanical irritation, such as the pressure of a growth or an aneurysm, may be treated by more potent drugs, and of these the best is undoubtedly heroin, which, however, should not be given unless there is a definite indication for its use. An excellent preparation is linctus heroin. et terpini chlor. of the B.P.C.

In many cases of chronic chest disease, the cough becomes a habit after a time and cough mixtures will then lose their effect. In sanatoria it is often found that moral suasion is useful in the treatment of this type of cough, and a simple cough lozenge, such as troc. sod. bic. (B.P.) may produce relief. In chronic asthmatic states, the night cough with wheezing which afflicts many patients is frequently in part due to habit and is often controlled by luminal given at bed-time.

HÆMOPTYSIS

The treatment of blood spitting has been much discussed, but complete rest is still the most effective single measure. Various drugs have been commended, but it is doubtful if any of them are of great value. Although morphine may be used to calm the patient, yet there is a distinct possibility that, by diminishing the respiratory movements, blood may be encouraged to stagnate in the bronchial tubes, and thus tuberculosis or other infection may be spread. It is customary to give calcium both by the mouth and by injection, yet there is little clinical evidence that it has any action whatever. More recently, the intravenous injection of a solution of congo red has been advocated and, although it is difficult to produce convincing proof of its value, it does appear to have some

action in promoting thrombosis in the affected area. Pituitrin and adrenaline are contra-indicated and the various hæmostatics appear to have little effect.

RELIEF OF PAIN

Another of the many ways in which a patient can be helped is by relief of pain. Pain may be due to many causes. Frequently it is due to spasm of the intercostal muscles as the result of constant coughing, in which event adequate treatment of the cough, and local applications of heat are most likely to be successful. The pain of acute pleurisy is best treated by immobilization of the affected side of the chest, except in pneumonia. Another common cause of severe pain is infiltration of the pleura by a growth, in which case the stronger anodynes are obviously necessary. It is clear that the cause of the pain must be appreciated before the appropriate therapy can be selected. Medicinal measures, such as aspirin, are efficacious only in the milder types but, except in acute cases, it is better not to use morphine. There can be no doubt that the more old fashioned methods such as local application of heat, and counter-irritants might be further exploited at the present day. In home nursing, the linseed poultice will often relieve pain, or antiphlogistine, its modern counterpart, may be used. The more elaborate electrical methods, such as diathermy, undoubtedly have their uses, although they are hardly adaptable to the average bedroom. Counter-irritation by means of blisters, or mustard plasters, or the application of leeches to the affected area, is often useful in the relief of acute pain. In more severe cases, it may be necessary to infiltrate the parietal pleura with novocaine, and in some cases of growth it may be necessary to block the intercostal nerves by means of alcohol injections.

PNEUMONIA

It is a common error to over-treat patients who are suffering from lobar pneumonia. It must always be remembered that this condition is self limiting and that the main indications are therefore for symptomatic treatment, to relieve pain and cough, to secure sleep, and to support the heart when neces-

sary. The treatment of pneumonia may present a number of problems. The use of serum has to be considered, and it is a fact that dramatic results may sometimes be obtained in suitable cases. In order to use serum effectively, there must be facilities for correct typing of the pneumococci, the organism must belong to a suitable group, and it must be remembered that, unless the treatment is carried out under skilled supervision, there is a distinct possibility of serious reactions. The general consensus of opinion would appear to be that serum should not be administered as a routine but that, in severe cases which are seen at a sufficiently early stage, the toxæmia may be appreciably lessened and the chance of recovery may thus be considerably improved. The treatment of acute pain in lobar pneumonia is commonly by means of morphine or one of its allies, and although the use of this drug at the time of the crisis has been condemned, the danger appears to have been overstated. Should the pain not respond to any of the ordinary measures, it becomes justifiable to induce a small pneumothorax simply in order to separate the two layers of the pleura, and this may be kept up for a week or more. A larger pneumothorax, such as was suggested some years ago in order to rest the affected lung does not appear to be a reliable method of treatment.

For many years it has been the custom to support the heart, and in order to secure this effect, digitalis has been prescribed as a routine from an early stage of the illness. Although this appears to be a sound line of treatment, yet the likelihood of heart failure in the average normal adult is not very great, and it is nowadays becoming exceptional to begin the administration of digitalis without the presence of some special indication. Should there be any urgent sign of failure of the heart muscle it is customary now to use one of the special digitalis preparations, such as digoxin, or to employ one of the more rapidly acting cardiac stimulants such as coramine or cardiazol. The results of these lines of treatment appear to be quite satisfactory, and it means that the average case receives less of an irritant drug.

The main indication in pneumonia is to procure sleep, and

there should not be any hesitation in giving morphine in adequate doses; this can be carried on for as long as necessary, even up to the time of the crisis. It is also an advantage to give small quantities of whisky or brandy to those patients who are accustomed to alcohol. The routine administration of oxygen is hardly necessary in most cases. The patient who is cyanosed will undoubtedly benefit, but when sufficient oxygenation is taking place, further oxygen is unlikely to do good, and the presence of the nasal catheter is likely to irritate the patient to his ultimate disadvantage.

INFLUENZA

In influenza, and in influenzal pneumonia, there are many proprietary preparations for which excellent results are claimed, both in prophylaxis and in treatment. The basis of some of these is bacterial, and others chemical, but it can be safely asserted that there is none which has a really reliable action. The best preparations are undoubtedly those containing quinine which appears to have an almost specific action in influenza. The routine administration of quinine bi-hydrochloride, in doses of one or two grains intramuscularly appears to be of considerable benefit. It must be remembered that outbreaks of influenza vary much in their clinical manifestations and in their response to treatment from year to year, but quinine will be found to be the most constantly useful drug for this type of infection.

PULMONARY SUPPURATION

Drug treatment in pulmonary suppuration and lung abscess is not as a rule very successful although it may be usefully employed in conjunction with rest and postural treatment. In cases in which infection is fuso-spirochætal, organic arsenical compounds may be administered either intravenously or locally through a bronchoscope, but the results are not striking. Emetine has been extensively employed on the continent without, however, any outstanding success, and more recently the intravenous injection of 30 per cent. solution of alcohol in normal saline has been advocated, but my experience does not

confirm the claims which have been advanced on its behalf. Quite recently ultra short-wave diathermy has been used in cases of lung abscess, and again excellent results are claimed, although the evidence of benefit is as yet by no means conclusive.

TUBERCULOSIS

The treatment of pulmonary tuberculosis depends far less on drugs than on general measures. It may be said that there is no drug treatment which is specific in this condition, or which can replace rest and collapse therapy. The introduction of gold treatment more than ten years ago was expected to produce marked improvement in the results, but this hope has not been realized. There is no doubt that gold injections, preferably by the intravenous route, play some part in assisting the healing of the more caseous forms of tubercle, but gold by itself is no cure for the condition. In fibroid tuberculosis, gold injections are of very little value. The dosage must be carefully worked out for each individual patient. As a rule it is best to start with 0.05 gm. of sanocrysin or crisalbine and these doses may be increased fairly rapidly up to a maximum of 0.5 gm. if there be no reaction. The most effective total course is between 4 and 5 gm. administered over a period of about two months. The value of tuberculin has been hotly disputed, but the great majority of observers are not convinced that tuberculin injections have any value in the treatment of pulmonary tuberculosis. So much prejudice has been engendered in the various discussions on this subject that it is impossible to obtain a balanced view on the matter. There is evidence that tuberculin injections are of considerable value in certain cases of non-respiratory tuberculosis, and I am not prepared to condemn tuberculin on my own experience in the treatment of pulmonary tuberculosis.

BRONCHIECTASIS

The treatment of bronchiectasis is almost entirely symptomatic, and it must be remembered that the clinical picture varies very much in different patients with this disease. In some, there is a succession of attacks of apparent "bronchitis" with localizing signs in the chest, and long intervals of freedom

from any symptoms. In these cases inhalations and cough mixtures may be prescribed during the attack and autogenous vaccines may be given in an attempt to raise the resistance of the patient. In other cases there may be copious sputum which may or may not be foul smelling. The treatment here is primarily by postural methods in order to drain the affected lobe or lobes of the lung. If only one lobe be affected and if the general condition of the patient be sufficiently good, then recourse should be had to surgery, and the affected lobe removed. If on the other hand, disease is present on both sides of the chest, then palliative drug treatment must be attempted. Routine inhalations, such as Coghill's solution, may be beneficial in helping to de-odorize the sputum and, if the infection be fuso-spirochætal in type, then arsenic may be administered, either by intravenous or by intramuscular injection, or even by mouth. In some cases local applications through a bronchoscope have been tried, but the results are only temporary at their best. Vaccines are of little value in this type of case. Another variety of bronchiectasis which is by no means uncommon, is that in which there are repeated hæmorrhages, but little cough or sputum apart from this. Drug treatment is not of great value, although injections of congo red may be tried. If surgery be not indicated it is better to leave such patients alone, as they will rarely come to any harm.

ASTHMA

The drug treatment of spasmodic asthma is a subject on which a great deal has been written. There can be no doubt that an acute attack can be stopped in the great majority of cases by the proper drug treatment. Adrenaline is the stand-by on these occasions and it should be injected in doses of 3 or 4 minims; in very severe cases it may be necessary to inject larger doses at the rate of one minim a minute through a hypodermic needle which is left *in situ* for half an hour. Should adrenaline fail, pituitrin may be successful, but some cases will only respond to morphine, preferably in combination with atropine. Inhalations of carbon dioxide have also been used with some success. The treatment of the asthmatic patient is not by

means of drugs alone. Asthma is a symptom and not a disease, and every patient must be investigated in order to find out why he has this symptom, and treatment must be devised according to his needs. Drugs play little part in asthma therapy. Should there be a prominent allergic factor, specific desensitization may be attempted but the results are disappointing. Under good conditions non-specific desensitization gives more promising results, and peptone, tuberculin, or magnesium hyposulphite are the simplest materials to employ. Another very useful method is auto-hæmotherapy. When the nasal factor is thought to be important a 2 per cent. ephedrine spray followed by a simple alkaline nasal douche is likely to improve the patient, and this can be combined with zinc ionization of the nose. The use of a cocaine spray should be deprecated except in special circumstances. In some cases of asthma there is defective acid secretion in the stomach and the routine prescription of acid. hydrochlor. dil. with meals is indicated. It must also be remembered that in many asthmatics there is a profound psychological factor and, in these cases, luminal may produce remarkable improvement. A multitude of other drugs have been advocated. Usually the patient has tried some of these, but their effects are rarely permanent, and it is probable that the benefit produced from any of the drugs or injections is, in part at least, psychological. A warning must be given against the promiscuous use of aspirin by asthmatic patients. Some of them are exceedingly sensitive to this drug and in such cases there may be an unexpected fatal result from quite a small dose. Finally, it is often desirable to give the patient a routine antispasmodic mixture while the more definitely curative lines of treatment are being commenced. The most suitable mixture for routine use is the following :

R.	Pot. iod.	-	-	-	-	-	-	3 grains
	Tinct. lobeliæ æther.	-	-	-	-	-	-	15 minims
	Aq. chlorof. ad	-	-	-	-	-	-	½ ounce t.d.s. p.c.

PULMONARY COLLAPSE

Acute collapse of a portion of a lung is a condition which is frequently misdiagnosed, yet it occurs following operations on

the abdomen, in some cases of asthma, and sometimes spontaneously. It is not a very serious condition in itself, but it usually results from the blocking of a bronchial tube with a plug of mucus. If left alone, complete re-expansion usually occurs within a few days, although sometimes a lung abscess may result. Efforts may be made to prevent the occurrence of this complication in patients who have recently undergone abdominal operations by encouraging deep breathing exercises. In a patient who shows any suggestion that a bronchus is becoming obstructed in this way there is a strong indication for the administration of carbon dioxide gas in a concentration of from 5 to 7 per cent. Suitable apparatus for this purpose can easily be obtained. Should efforts to clear the obstruction prove unsuccessful, it may be necessary to pass a bronchoscope in order to suck out the mucus.

PULMONARY ŒDEMA

Œdema of the lungs occurs generally as the result of a failure of function of the left ventricle, and it is not therefore strictly a disease of the lungs. The clinical picture, however, is that of an acute pulmonary catastrophe, and the treatment may therefore be reasonably considered here. The patient is usually critically ill, with marked dyspnoea, cyanosis, much cough, and the expectoration of large quantities of frothy sputum. Although a fatal result is common, energetic treatment may bring about recovery. In these cases adrenaline is of the utmost value and it may be administered in doses of ten minims at half-hourly intervals. The effect of this is frequently dramatic and it may be reinforced by giving injections of strychnine and strophanthin in full doses together with intra-nasal oxygen.

USE OF OXYGEN

It is frequently necessary to give oxygen in acute pulmonary disease, although the common method of administration through a funnel held in front of the patient's nose is undoubtedly useless. Improved methods have been devised for giving oxygen, but it seems that the most convenient for routine use is the nasal catheter. Recently the method of enclosing

the patient in a special oxygen tent has been strongly advocated, and there can be no doubt that, by this means, the patient can be induced to breathe an atmosphere containing a known and high concentration of oxygen. The earlier oxygen tents were heavy and cumbersome and quite unsuitable for use in most bedrooms; the nursing of patients in an oxygen tent was also extremely difficult. More recently, lighter and altogether more useful apparatus has appeared on the market, but even with this the patient is never really comfortable, and the nursing is still by no means easy. It is too early to express any definite view as to the value of this method of treatment, and there can be no doubt that the apparatus will inevitably be greatly improved in the future; for practical purposes it may be said that the results of the intranasal administration of oxygen are almost as good, and very much less discomfort is caused to the patient. Oxygen is most useful in acute conditions in which cyanosis is present. Its greatest use is therefore in pneumonia, in some cases of spontaneous pneumothorax, and in heart failure. Although it may be of value in some such chronic conditions as emphysema, the effect is only temporary, and it is doubtful whether anything is to be gained by its administration in these cases.

THE USE AND ABUSE OF DRUGS IN TUBERCULOSIS

By PHILIP ELLMAN, M.D., M.R.C.P.

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MOST experienced observers hold the view that tuberculosis, like all other bacterial diseases, manifests itself by : (1) a local inflammatory lesion of a particular tissue, organ or system ; (2) a constitutional disturbance due to the absorption of bacterial products from the primary focus into the systemic circulation. In order adequately to appreciate the scope and limitations of drug therapy in tuberculosis it is necessary that the general condition of the patient should receive the same attention as the local tuberculous lesion.

The medical manifestations of tuberculosis are essentially : (1) Pulmonary :—lungs, pleura and intrathoracic glands ; (2) abdominal :—peritoneum, intestines, lymphatic glands, kidneys ; (3) nervous, e.g. meninges, and (4) general, e.g. miliary tuberculosis. It is, of course, assumed that due consideration of the clinical, X-ray, and pathological aspects will precede any decision in regard to treatment. This will indicate the obvious limitations of drug therapy.

The fact that no specific treatment has as yet been found for tuberculosis has been responsible for the introduction of many of therapeutic agents recommended for its cure, and much irregular practice has been encountered in connection with the drug treatment of this disease. Chemotherapy in tuberculosis was originally stimulated by the results of Ehrlich's researches into the development of the arsenical group of drugs in syphilis. Chemotherapeutic methods aim at the destruction of the tubercle bacillus *in vivo* without the destruction of the tissue cells, but, in view of the non-vascularity of the tubercle, direct action through the varied therapeutic bacterial agents has been found to be almost impossible. Research on these lines has been carried out systematically, particularly in America by Wells and his co-workers.

The chemotherapy of gold salts, copper compounds, silica, calcium and guaiacol has been the study of many

observers. In view of the fact that a chemical agent in chaulmoogra oil had been found to check the attack of the acid-fast leprosy bacillus, it was hoped that some similar agent might have a similar effect on the tubercle bacillus. It must be admitted, however, that, despite much experimental work on tuberculous animals, no specific chemotherapy for tuberculosis has, as yet, been found. At the same time, as Wells points out, no one has discovered a satisfactory experimental test animal whose resistance corresponds closely to that of the human consumptive. To quote his own words : "Man alone has classical phthisis pulmonalis."

It is, of course, well known that experimental work on animals with drugs in the laboratory does not by any means always apply in actual clinical practice; otherwise many clinical therapeutic methods would fail to stand the test of laboratory experimentation. On the other hand, certain drugs have been shown to be beneficial in clinical practice in spite of discouraging laboratory results and, since no specific drug which will cure tuberculosis is yet known, it is not necessary to discard such drugs too readily. In this article attention will be confined to a series of drugs which have received some degree of recognition.

GOLD SALTS

The use of gold salts in tuberculosis dates back to antiquity. In more recent times (in 1890) Koch proved that gold cyanide in very dilute solution (1 in 1,000,000) inhibited the growth of tubercle bacilli in culture. Feldt and other workers experimenting on a number of gold salts found them unsuitable for human tuberculous subjects because of their toxic nature. In 1925, Møllgaard made certain claims for sanocrysin, a double thiosulphate of gold and sodium. The preparation aroused great interest and enthusiasm which were ultimately responsible for much abuse of the drug with many disastrous effects and, in a certain number of cases, the reactions of the large doses that were given at that time proved fatal.

No specific effect can, however, be claimed for this preparation, although clinical observations extending over some years go to show that in selected cases, with the dose carefully controlled to avoid any violent reactions, certain preparations of

gold are responsible for reducing both the quantity of sputum and its bacterial content, thus diminishing the infectivity of the successfully treated patient. Gold, when used with discrimination, may be of great value. Apart from diminishing the fever, the quantity of sputum and the number of tubercle bacilli in the sputum, it may improve both the local lesion and the general condition of the patient. Its favourable effect on the nature and extent of the pulmonary lesion is seen in serial skiagrams, which may show evidence of healing by resolution and fibrosis.

The indications for the use of the drug in pulmonary tuberculosis are as follows: (1) When the disease is of exudative rather than of fibrotic type. (2) To diminish the quantity of sputum and the number of bacilli. (3) In conjunction with collapse therapy (e.g. artificial pneumothorax), when there has been a fresh area of spread in the sound lung.

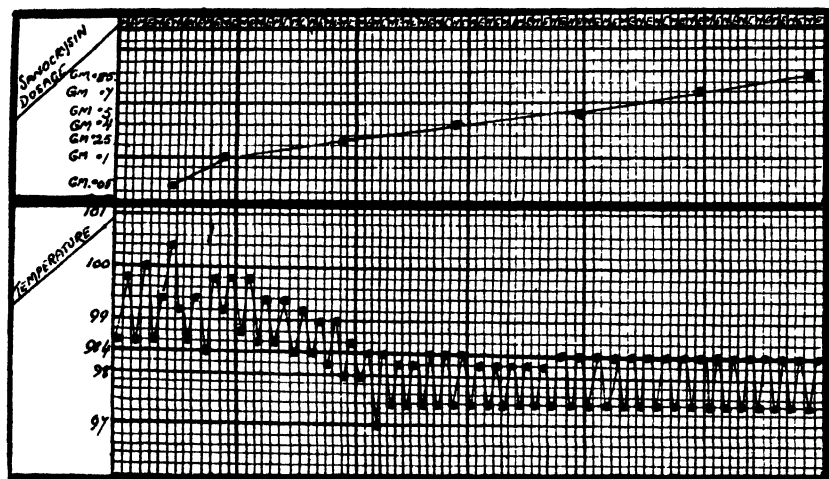
The contra-indications are : (1) Severe febrile reactions. (2) Gastro-intestinal disturbance, vomiting, diarrhoea, jaundice, and stomatitis. (3) Marked and persistent albuminuria or loss of weight. (4) Toxic rashes—any erythema or dermatitis after injections.

The following scale of dosage of sanocrysin is the one now usually adopted and found to be generally satisfactory, although it is important to test the sensitivity of the patient with small doses :—

Intravenous injections at five to seven day intervals, each injection being preceded by an examination of the urine. The first dose is 0.01 gm., which is increased to 0.05, 0.1, 0.25, 0.4, 0.5 gm., until about 5 gm. in all have been given. Some physicians prefer not to exceed the 0.25 gm. dose. The course can, if necessary, be repeated after an interval of at least six weeks, provided that no reactions have resulted.

Since the introduction of sanocrysin other preparations have been introduced, with varying dilutions of gold. In general, certain preparations which have been introduced for intramuscular injection have the advantage that the absorption tends to be more gradual, with less liability to toxic effects. Of these myocrysin, crisalbine, allocrysin, oleo-sanocrysin and solganol B oleosum are well known. The dosage is almost

the same as for sanocrysin. The addition of calcium gluconate tends to minimize the toxicity of the drug, and it is a convenient and satisfactory plan to dissolve the requisite dose of gold salt in the solution of calcium gluconate (5-10 c.cm.) and to give the mixed injection intravenously or intramuscularly, according to the nature of the gold salt used. This has the advantage of avoiding two separate injections.



theory in tuberculosis and in active caseating tuberculous lesions in the lungs, cervical, mediastinal and abdominal glands, or elsewhere, and this must undoubtedly take place in some measure. The strong claims made in this connection have not, however, been supported by experimental evidence.

In 1925, at Colindale Hospital (London County Council) I estimated the calcium content of the blood, principally in cases of pulmonary tuberculosis, although a few cases of tuberculous adenitis were included. The normal calcium content of the blood lies between 9 and 12 mgm. of calcium per 100 c.cm. of blood. My findings showed that it was possible to raise the minimum normal content of the blood (the low minimum normal quantity being found in active cases) to its maximum level, and that this induced a corresponding improvement in the local and general conditions (*Tubercle*, 1928, 162; 1929, 257).

My results have led me to believe that calcium therapy, given in suitable doses on an empty stomach, over a sufficient period of time, can influence calcium metabolism almost as insulin influences sugar metabolism.

Dosage and preparation.—The preparation of calcium which is best absorbed and tolerated is the gluconate. It may be given orally, intramuscularly or intravenously. The chocolate coated tablets (Sandoz), each containing 25 to 50 gr. may be given three times a day, before meals, according to the nature of the case. An equivalent dose may be given by mouth in the form of syrup. A new solution of calcium glucono-galactogluconate corresponding to a 10 per cent. and 20 per cent. solution of the gluconate (calcium Sandoz) is an extremely valuable and more stable preparation for both intramuscular and intravenous injection: 5 to 10 c.cm. of a 10 per cent. solution of calcium gluconate may be given either intramuscularly or intravenously, daily in acute cases and every third day in subacute cases. Calcium lactate is not so effective and is frequently given in insufficient dosage. Calcium chloride is most effective when administered by intravenous injection and is specially useful in intestinal tuberculosis for checking diarrhoea and relieving pain. It is interesting to note that it has now been established that adequate absorption in calcium therapy occurs when the preparation is given between meals as at this time intestinal alkalinity is not so marked.

Parathormone, an active hormone of the parathyroid, in conjunction with calcium, is often efficacious. It should be given

in doses of 10 to 20 units, subcutaneously, daily in acute cases, and on alternate days in subacute cases. The additional use of parathormone is said to enhance the action of the calcium by fixing it in the tissues and promoting absorption. Calcium and parathyroid therapy are of value in raising the calcium content of the blood to its maximum normal concentration point.

The use of calcium in certain resistant pleural effusions, in which it promotes absorption of the tuberculous exudate, is sometimes striking. Attempts to hasten calcification by giving calcium salts together with vitamin D or irradiated ergosterol in *tabes mesenterica* have met with a certain measure of success. Recent work on calcification of the tubercles in experimental animals shows that vitamin D or irradiated ergosterol has a great effect on the promotion of calcification of caseous tubercles (Levaditi and Li, 1931, Jampolis and Witt, 1933). It is essential, however, to remember that calcium therapy must be given over a sufficiently prolonged period of time, if any appreciable results are to be obtained. Failure to do this probably accounts for a number of equivocal results.

VITAMIN THERAPY

Cod-liver oil.—The present status of cod-liver oil in the treatment of tuberculosis may certainly be regarded as a compliment to the clinical acumen and accuracy of the old clinicians. The oil has been used for centuries in the treatment of all forms of tuberculosis. Some regard it purely as a food and attribute its value to the high percentage of unsaturated fatty acids. If this were its sole recommendation, many would regard it as an unnecessarily distasteful way of taking fats, but it is now known that the real value of the oil lies in its potency in respect of two fat-soluble vitamins, one serving, in a limited measure, to increase resistance to infection, the other serving to promote the metabolism of calcium. It owes, in fact, its principal properties to its vitamin A and D content. The British Pharmacopœia addendum requires a standard of not less than 600 units of vitamin A per gm. and not less than 85 units of vitamin D per gm. Vitamin D is closely correlated with calcium metabolism and, in sufficient quantities, can mobilize calcium in the blood—probably through the parathyroid hormone. If given in adequate quantities it may even

produce a hypercalcæmia with increased deposition of calcium in the tissue cells and increased calcium absorption. For continuous administration the plain oil is probably the most satisfactory. It is most valuable if it can be taken without the production of any gastric disturbance. Many patients may be trained to it by starting with small doses. If the oil and the spoon from which it is taken are kept on ice, the odour is less noticeable, and a number of patients have informed me that, by eating a banana immediately after swallowing the oil, the taste and smell are overcome. To begin with, especially in children, small doses are preferable, starting with a few drops, increasing to half a teaspoonful and later up to as much as a tablespoonful, according to age, three times a day after meals. When secondary anæmia is present I frequently prescribe: syr. ferri phosph. co., and ext. malt and ol. morrhuæ in equal parts. The contra-indications to cod-liver oil therapy are fever and intolerance of the drug, with resulting derangement of appetite and digestion.

More palatable preparations with malt extract are, of course, available. Radiomalt, extracts of malt with iron, hypophosphates and with quinine and strychnine (Kepler) can be recommended according to individual requirements. Radiomalt is both an active and palatable preparation. Irradex (Parke, Davis & Co.) which is a combination of vitamins A, B, and D, together with iron and manganese in a palatable malt vehicle is of high nutritive value and is especially indicated in tuberculosis with secondary anæmia. Halibut-liver oil is a useful preparation which is rich in vitamins A and D. When cod-liver oil is not tolerated it can be combined with malt extract. In children a dose of 1 to 4 drops, three times daily, according to age, and in adults 3 to 4 drops, three times daily, may be given. A pleasant way of taking this oil is in the form of haliborange (Allen & Hanburys)—a preparation rich in vitamins A, C and D. Haliverol (Parke, Davis & Co.) is halibut-liver oil with viosterol. It is an active preparation and is given in doses of 3 minims three times daily.

In 1929, McConkey reported good results in the treatment of *intestinal tuberculosis* by floating $\frac{1}{2}$ oz. of cod-liver oil on 3 oz. of tomato juice, iced, in a small glass, after each meal. It is

certainly worth a trial in these cases.

The addition of drugs, such as salol, beta-naphthol and dimol, for controlling sepsis and relieving pain and diarrhoea, and the omission of milk from the diet are further measures useful in certain cases of intestinal tuberculosis.

Viosterol, i.e. irradiated ergosterol, is a valuable concentrated preparation to be used when the oil cannot be tolerated : 15 to 20 drops daily, i.e. 5 drops three times a day, is the usual dose. Adexolin, 1 capsule three times a day is another well-recommended preparation. Radiostoleum is a highly active concentrate of vitamins A and D, forming a concentrated oil liquid in which both vitamins are present in biologically standardized and scientifically harmonized amounts. It can be administered as a liquid or in the form of capsules of the liquid, 5 drops three times daily for adults. The capsules are equivalent to 6 minims of the oily liquid.

CREOSOTE

Although the use of creosote in tuberculosis has been recommended for over a century, no worker has so far shown that it has any bactericidal power on the tubercle bacillus. Not infrequently it lessens expectoration, cough and fever, and sometimes it may improve the appetite and general condition. When there is a superadded bronchitis, creosote often has a beneficial effect. It also tends to limit the risk of secondary infection and to lessen the possibility of the lesion spreading. When irritating cough and abundant sputum exist, its use is particularly recommended. Unless the dosage is carefully controlled, however, it has the disadvantage of upsetting the digestion, a most unsatisfactory state of affairs in a disease like tuberculosis. It is contra-indicated if it provokes gastric upset but when, in a chronic fibroid lesion, the appetite and digestion are impaired, it may be beneficial.

Creosote may be taken in capsules or mixed in an emulsion of cod-liver oil or in the following prescription :

R.	Creosote	-	-	-	-	-	-	30 minims
	Pepsin wine	-	-	-	-	-	-	4 ounces

By mouth the drug should in the first place be prescribed in 1 minim doses and very gradually increased until 5 to 10 minims

are reached.

The late Sir R. Douglas Powell used to recommend the following :

R	Creosoti carbonatis	-	-	-	-	-	$\frac{1}{2}$ ounce
	Tinct. gent. co.	-	-	-	-	-	$\frac{1}{2}$ ounce
	Syr. virginian prune	-	-	-	-	-	3 ounces

1 teaspoonful in a wineglass of water or malt extract three times a day before meals. Increase the dose by 5 drops each second day until 2 teaspoonfuls are reached.

In certain advanced cases the inhalation of creosote may relieve cough and promote expectoration. The following prescription for such inhalations on an oro-nasal respirator may sometimes be of value, especially where the sputum is copious and offensive :—

R	Menthol	-	-	-	-	-	120 minims
	Creosoti	-	-	-	-	-	90 minims
	Spt. camphoræ	-	-	-	-	-	90 minims
	Spt. rectificatum ad	-	-	-	-	-	1 ounce

Creosote and spt. chlorof. with 20 per cent. spt. menthol, in equal parts, and certain neboline compounds (Oppenheimer & Son) for use by inhalation in an æriser, which contain creosote and are sometimes quite valuable. Resyl (Ciba), being glycerio-guaiacol-ether, taken three times a day is yet another valuable preparation.

Guaiacol.—Guaiacol carbonate in doses of 5 to 15 grains has a mild antiseptic effect and is less toxic and objectionable than guaiacol itself, which is the main active principle of creosote. Like creosote, it tends to limit the risk of secondary infection and is likewise used when irritating cough and abundant sputum occur. It can be made up in capsule form. The preparation potassium-guaiacol-sulphonate (thiocol) may be given in small doses and has the advantage of being both tasteless and odourless. A palatable preparation with malt extract (Wander), containing guaiacol carbonate gr. 2 to the tablespoon, is a useful combination.

OTHER DRUGS

Garlic.—Garlic in various forms has been used medically for many centuries but it is doubtful if it has any real therapeutic value. It has been used in pulmonary and laryngeal tuberculosis and the fresh juice has been used as an inhala-

tion in phthisis.

Iodine.—The use of iodine in certain chronic cases of pulmonary tuberculosis has been recommended for many years but no clinical or experimental work of any note or authority has shown that it has any special therapeutic effect on this disease. If used at all, iodine must be administered with the greatest caution. Intensive treatment has been recommended as follows: 30 to 40 grains of potassium iodide, to be taken in the morning, followed by 1 ounce of chlorine water at three-hourly intervals during the day. Nascent iodine is said to be set free in the tissues, but, although some good results have been recorded, aggravation of the disease, with pyrexia, has also been reported as a result of the treatment. It is generally recognized that iodides may produce increased expectoration and physical signs in the chest and the appearance of tubercle bacilli in sputum which has previously been negative. The use of iodine as a therapeutic measure should be confined to the more chronic fibrous lesions.

Sodium morrhuate, which has been used intramuscularly and has been in vogue in recent years, is quite ineffective and its use is not recommended.

Chaulmoogra oil.—The beneficial results of chaulmoogra oil and its derivatives in leprosy have aroused among many workers hopes that it might prove to be a therapeutic agent in tuberculosis. As yet, however, no reliable clinical or experimental work has shown their hopes to be justified.

Insulin.—In selected cases of tuberculosis, in which poor nutrition and an impoverished appetite exist, insulin will often combat anorexia after every other measure has failed. In such poorly-nourished patients, whose resistance to disease is necessarily feeble, insulin, by inducing a mild hypoglycæmia, may stimulate the appetite, thereby improving the nutrition and increasing resistance. There are, therefore, possibilities of its becoming a therapeutic factor of considerable importance. It is not possible to detail here the definite indications, contra-indications and dosage of insulin, but it should be emphasized that its indiscriminate use is fraught with danger and is likely to discredit an otherwise useful method of treatment. Its possible use and abuse in tuberculosis will be fully discussed

in a subsequent issue of *The Practitioner*.

TUBERCULIN

Although tuberculin does not, properly speaking, come into the category of drug therapy, no preparation has been subjected to greater use and abuse in cases of tuberculosis, and a brief consideration of it here would seem to be appropriate. Some extremists have no use whatsoever for it, and others regard it as the panacea for all forms of the disease. Both schools are, in my view, equally wrong. Experience has led me to believe that, in carefully selected cases, tuberculin therapy can be of real value provided, however, that the patient is under close supervision during treatment. As Fishberg points out, the action of all tuberculins is fundamentally the same, the preparations differing only as regards strength, toxicity, and capacity for absorption.

There are, essentially, four types of tuberculin : (1) Old tuberculin (the best known preparation is Koch's old tuberculin) ; (2) New tuberculin or T. R. ; (3) Mixtures of 1 and 2 ; (4) Bacillary emulsion (B.E.) being a vaccine consisting of simple emulsions of killed, treated or untreated bacilli.

The value of tuberculin in the treatment of certain non-pulmonary conditions has received general recognition, notably in tuberculous adenitis, providing there is no caseation, in tabes mesenterica, in ocular tuberculosis and in renal tuberculosis, especially when both kidneys are involved. In the inoculation department of the London Hospital such cases are treated and supervised over a period of many years and good results are unquestionably obtained. Many people issue solemn warnings against its use in pulmonary tuberculosis. I believe this attitude is wrong, for every form of treatment is likely to suffer from indiscriminate usage and tuberculin is no exception to the rule. Its scope, however, in pulmonary tuberculosis is limited.

It is my experience that when the correct type of case has been selected tuberculin may be of value. (*a*) in stimulating healing by fibrosis ; (*b*) in increasing resistance. It is absolutely contra-indicated ; (*a*) in a febrile type of case ; (*b*) in advanced cases with marked wasting ; (*c*) in cases with caseating lesions which show no resistance.

The varied preparations outlined above are all in use, but my own preference now favours the bacillary emulsion or old tuberculin. During the whole of the treatment it is important to keep a chart indicating morning and evening temperatures (the thermometer must be kept in the mouth for 5 minutes), pulse rate and weekly weight.

Whichever preparation is used a subcutaneous injection is given (the skin of the infrascapular region is a very insensitive area) in minute doses, starting with 0.1 c.cm. of a dilution of 1/100,000. The method of increasing and spacing the doses is of considerable importance. It is now my practice to double the dose, viz. 0.2, 0.4, 0.8 c.cm. of the same dilution, then again 0.1, 0.2, 0.4, 0.8 c.cm. of the next solution (1/10,000), then of a 1/1,000 solution, and so on, until a mild reaction occurs. When a reaction does occur the next dose should either be the same or a reduced one, according to the degree of reaction produced. The same dose should be repeated until the patient gives no reaction at all. Treatment aims therefore at using the highest graduated increase of dosage without causing a reaction and, ultimately, at immunizing the patient even to pure tuberculin. The spacing of doses is a matter of experience. Originally I used a weekly interval. This is a safe procedure with the smaller doses but when the higher ones are reached violent reactions may sometimes occur, necessitating intervals varying from two to twelve or even more weeks. Sutherland's method with bacillary emulsion of not repeating an injection until the subcutaneous lump has disappeared is sound in practice and, whilst with the early small doses, weekly injections (some people give two injections per week) are the general rule, it will be found that with the higher doses the interval is more prolonged until, if and when the pure B. E. is reached, the interval may vary from eight to twelve weeks. The maximum dose is the largest dose which can be tolerated without reaction and varies according to the individual. If a patient has responded favourably to tuberculin and has been quite free from reaction—these may be (*a*) local, (*b*) general or febrile—then the sudden occurrence of a reaction should be a warning that the patient is approaching the limits of tolerance.

THE USE AND ABUSE OF DRUGS IN KIDNEY DISEASE

By ROBERT PLATT, M.D., F.R.C.P.

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ALTHOUGH the symptoms exhibited by sufferers from kidney disease are of the most diverse character, the scope for medicinal treatment is undoubtedly small. Diuretics are practically the only drugs which may be said to influence directly the manner in which the kidney acts, and these are of much more value in cardiac than in renal disease. Acids, alkalis, and urinary antiseptics influence the composition of the urine without affecting to any extent the work of the kidney. These are of use in the infections of the urinary tract and will be mentioned later. The remainder of the drugs which are, or have been, used in nephritis exert their effect upon the patient and his symptoms rather than upon the kidney itself.

ACUTE NEPHRITIS

In acute nephritis without complications it is almost an abuse to order any drug at all unless it be a mild dose of magnesia to prevent constipation. By the prescription of rest, warmth, nursing and a proper diet the demands of the medical practitioner and patient for an active therapy should surely be satisfied without having recourse to the bottle of medicine. Moreover the administration of useless drugs may distract attention from the other more important methods of treatment. Mild diaphoretic and diuretic mixtures are in any case useless; most of them contain sodium, and all contain water, two constituents of the patient's diet which are restricted in this disease. The more powerful diuretics (mersalyl,* urea) should not be used in any case of acute nephritis, and the disadvantages of pilocarpine outweigh any theoretical value it may be supposed to possess. Nor can the drastic purgatives—the

* Mersalyl is the name now given to organic mercurial diuretics of the salyrgan type. Somewhat similar preparations are "neptal" and "novurit."

traditional jalap—be allowed to keep their place any longer in renal therapy since they irritate the bowel, increase toxæmia, and in large doses are capable of poisoning the very organ it is desired to cure. It must always be remembered that the kidney, as chief excreting organ, is called upon to dispose of most of the drugs (or their end products) which are prescribed, and for that reason alone, the safe rule in active renal disease is to administer as few poisons as possible. Certain complications may, however, form an exception, when the relief of symptoms becomes temporarily the foremost need of the patient. Thus for headache, aspirin or even morphine is valuable; for vomiting, luminal by mouth or sodium luminal hypodermically; for convulsions chloral or morphine may have to be used in full doses, but a venesection, lumbar puncture, and hypertonic rectal saline should be tried first; for cardiac symptoms again (dyspnœa and pulmonary congestion) venesection is more valuable than digitalis, which has usually no beneficial effect at all.

In convalescence or in protracted cases iron is most valuable if, as is often the case, anæmia has developed. Large doses are usually necessary such as 90 grains per day of iron and ammonium citrate in an adult, or its equivalent in Blaud's pill or in one of the active proprietary preparations.

NEPHROSIS

Although most authorities now regard lipid nephrosis as merely a sub-variety of nephritis, its chronicity and the absence of any marked tendency to progress into hypertension or uræmia allow of the use of drugs which are inapplicable in any other type of renal disease. Provided the criteria of diagnosis are satisfied—œdema and massive albuminuria, with absence of hypertension, hæmaturia and nitrogen-retention—various therapeutic attacks can be made on the œdema. Thyroid extract (or thyroxine) of which these patients are extraordinarily tolerant may be tried in large doses, for instance up to 15 grains or more of the extract daily. The pulse rate should, of course, be watched.

Both the acid-producing salts (ammonium chloride, calcium

chloride, ammonium nitrate) and the alkalis have been shown to have a favourable influence on the œdema in some cases, but the most efficient therapy possible consists of the combination of ammonium chloride or nitrate in doses of 4 to 6 gramme per day and an injection of mersalyl twice a week. The ammonium salts may be given in medicine form disguised by liquorice, or swallowed in one-gramme capsules. The mersalyl may be given intramuscularly or intravenously. Perhaps before these more drastic diuretics are used, a course of urea therapy might be instituted. This must be given in large doses such as 10 grammes thrice daily. Each dose can be taken in about two ounces of water flavoured with syrup of orange. Its only disadvantage is a tendency to cause vomiting and anorexia in some cases. In the milder cases of subacute nephritis with œdema, with little tendency to hypertension or uræmia, urea may also be given and even (with great caution) mersalyl, but in advanced or active cases, such treatment constitutes a definite abuse and the drug therapy is modelled on that of acute or chronic nephritis according to the stage which the disease has reached. In all these conditions iron may again be useful.

CHRONIC NEPHRITIS

In the chronic stage of renal disease the scope for drug treatment is again very limited and the judicious use of rest and diet is far more important. For the hypertensive cerebral attacks consisting of severe headache, sickness and prostration, morphine may have to be given. For patients liable to such attacks, half a grain of luminal twice or three times daily may be helpful in reducing their frequency and intensity. For the persistent vomiting of developed uræmia, subcutaneous sodium luminal is useful, and for the so-called renal asthma, the acute dyspnœa which occurs in some uræmic cases, alkalis such as sodium bicarbonate in 30-grain doses every three or four hours are beneficial. Throughout the whole course of chronic nephritis it is often wise to give iron and a regular saline aperient.

The same treatment applies to cases of nephrosclerosis in

malignant hypertension and to other types of renal failure such as renal dwarfism in children and polycystic kidney. Cases of pregnancy albuminuria and eclampsia may be treated on the lines indicated in acute nephritis. In the latter condition the writer feels that the administration of chloroform for the fits should be avoided on account of the liver damage which is always present.

PYELONEPHRITIS

The term "pyelonephritis" is here used to include conditions often described as infections of the urinary tract, or as pyelitis, or pyelitis and cystitis, in which the infecting organism is usually the *Bacillus coli*. These form a sharp contrast to the other diseases of the kidney in that the correct use of drugs is by far the most important item of treatment. In acute pyelonephritis with high temperature, renal pain and dysuria, urinary antiseptics should never be used as the cases respond far more rapidly at this stage to massive doses of alkali. Either sodium bicarbonate or potassium citrate may be used, separately or combined. The initial dose is usually 60 grains every two hours and if the symptoms are not subsiding within twenty-four hours, the dose should be given hourly even though the urine is already alkaline. Copious fluids are given at the same time. When the temperature has subsided the medicine should be continued at three- or four-hourly intervals. The common mistakes made in treatment are not to give enough alkali, and to stop treatment too early. Very occasionally other methods of treatment, such as catheterization of the ureter, may have to be used but as a rule the only difficulty is in cases of vomiting when the alkaline medicine is not tolerated. As a rule this can be overcome by giving smaller doses at even more frequent intervals. Morphine may occasionally be required for severe headache or renal pain.

It must be strongly emphasized that the alkaline treatment of pyelonephritis, although specific for the symptoms of the acute cases, is in no sense curative and that even when the patient feels perfectly well after about a week or less of treatment, pus cells and organisms are still to be found in the urine. At this stage it is essential to give some efficient treatment to

clear up the infection and sterilize the urinary tract, and by far the most useful drug in this connection is sodium or ammonium mandelate. If this is not done there is a strong probability that the patient will either develop a chronic pyelonephritis, which is much more difficult to treat, or that after a week or two of comfort another acute attack, possibly in the other kidney, will supervene.

Mandelic acid therapy, recently introduced by Rosenheim, has already proved itself to be the most satisfactory and efficient treatment for *Bacillus coli* infections and has quite supplanted the ketogenic treatment out of which it arose. It is to be used in cases of acute pyelonephritis after preliminary treatment by alkali as already indicated and also in all chronic cases provided that reasonable precautions have been taken to exclude surgical conditions such as calculus and pyonephrosis. Mandelic acid itself is a gastric irritant and cannot be used. It was therefore given in the form of sodium mandelate and the urine made strongly acid by the simultaneous administration of ammonium chloride. Lately it has been found possible to combine the effect of these drugs by giving ammonium mandelate alone. The dose of ammonium mandelate for an adult is three grammes four times daily after meals. It is essential that a high urinary acidity should be produced, having a pH of 5.3 or less. This can be simply tested by the addition of a few drops of methyl-red solution to about 2 c.cm. of urine. If the acidity is satisfactory a pink colour develops and if not the indicator will turn yellow.

In the majority of cases ammonium mandelate given in these doses ensures the necessary acidity. If not, ammonium chloride must be given as well in doses of one gramme, two or three times daily. It is best given in capsule form. During mandelic acid treatment the fluid intake is restricted to two pints per day. The urine is examined daily for acidity and a wet film can be made now and then and examined for pus and bacilli. When this appears to be clear a catheter specimen can be obtained for culture. In most cases sterile cultures are achieved within seven to fourteen days, and if so it is advisable to continue the treatment for another three or four days, or in

chronic cases for a week.

In long-standing cases of pyelonephritis, mandelic acid treatment may fail, or after a temporary success the condition may rapidly recur. In the latter event another course of treatment may be tried but it is now being found that some of these cases recur so rapidly that it is useless to continue the treatment. In this case the only therapy which can be adopted is a control of the condition to prevent exacerbations and acute relapses. This is best done either by giving about 60 grains of alkali three times daily or by giving urinary antiseptics such as hexamine or pyridium, but if every case of acute pyelonephritis were properly treated from the first and not discharged until sterile urine has been obtained, the chronic and recurrent cases would be much less common.

The introduction of mandelic acid therapy has thus thrown a new responsibility on the practitioner to see that treatment is properly and thoroughly carried out. This is of course the case whenever a new and efficient remedy is introduced into medicine. For instance, liver treatment has given patients with pernicious anæmia a chance of becoming cured of their ailment so long as they persevere with the treatment, but how often, owing to lack of understanding on the part of the patient or the practitioner, only a half cure is obtained, and a certain degree of invalidism remains. The practitioner is so used to dealing with diseases which at most he can only relieve, that he may fail to recognize the case in which his knowledge of the details of treatment will make all the difference between illness and health. Urinary infections are now coming into this category.

THE USE AND ABUSE OF DRUGS IN GASTRO-INTESTINAL DISORDERS

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THE drugs available for use in gastro-intestinal disorders are legion. A few have the authority of experiment and experience, some proceed from an enlightened empiricism, but the majority are dictated by a tyrannical tradition from which the medical profession is but slowly escaping. An attempt to deal justly with the majority of these substances within the limits of a short article would produce a mere catalogue. Some selection was imperative, and this has been governed partly by well-recognized values and partly, and inevitably, by personal preference. Similar considerations have dictated the proportion of space devoted to each group. Omissions were unavoidable; thus no mention is made of digestive ferments or intestinal antiseptics. In both groups experimental and clinical evidence of their value is unconvincing. Histidine, a recent and much vaunted remedy in the treatment of peptic ulcer, has not fulfilled the claims originally made for it, and has been strongly criticized on experimental and clinical grounds (Hurst¹, Florey², Ryle³). Further reference to it in this article seems superfluous. The drugs and preparations dealt with represent what may be described as "the old guard," dressed, it is hoped, in an up-to-date and serviceable uniform. They will be considered in the following groups: alkalis and antacids, acids, alcohol, carminatives, bitters, antispasmodics, spasmodics, sedatives, astringents, aperients.

ALKALINE SALTS AND ANTACIDS

Alkaline salts and antacids, such as bismuth, have long been recognized as the most effective remedies available for controlling gastric acidity and for the relief of gastric discomfort, but within recent years, owing to increasing advertisement and a somewhat uncritical attitude on the part of the profession, they have obtained a prominence and popularity, which is not without its disadvantages. Alkalis give relief, they do not

cure; and their very effectiveness tends to mask symptoms and to produce a false sense of security, with the result that the doctor is not consulted until late, investigation and accurate diagnosis are postponed, and valuable time may be wasted. Further, most of the alkaline salts are capable of producing an alkalosis which may, if unrecognized, lead to severe and occasionally fatal symptoms. The indiscriminate use to which they are being put at the present day is greatly to be deplored. In practice the alkalis and antacids have three main uses, the control of gastric acidity, the relief of symptoms, the removal of mucus, and the stimulation of the production of hydrochloric acid.

THE CONTROL OF ACIDITY.—Although there is no evidence that hydrochloric acid in such concentrations as are met with in the human stomach exerts any deleterious effect on a healthy mucous membrane, in the presence of inflammation and ulceration it acts as an irritant, delays healing, and favours chronicity. Its control becomes an object of primary importance in the treatment of peptic ulcer and hyperacid gastritis, as is exemplified in most regimes, notably those of Sippy and Hurst, in which an effort is made to keep the gastric juice neutral, or nearly so, during the waking hours. The ideal antacid should be insoluble; it should not irritate the stomach or duodenum; it should be neutral in aqueous suspension, but capable of neutralizing hydrochloric acid; it should not alter unduly the acid-base equilibrium of the body, and it should not give rise either to constipation or diarrhoea. Judged by these standards, most of the alkalis fall a good deal short of what is desirable. Their relative efficiency as alkalis in terms of sodium bicarbonate (=100 per cent.) is seen in the following table (Freezer, Gibson and Matthews)⁴ :—

Magnesium oxide	-	-	-	-	317 per cent.
Magnesium peroxide	-	-	-	-	160 „
Magnesium carbonate (basic)	-	-	-	-	145 „
Sodium bicarbonate	-	-	-	-	100 „
Sodium citrate	-	-	-	-	61 „
Tribasic calcium phosphate	-	-	-	-	61 „
Potassium citrate	-	-	-	-	58 „
Tribasic magnesium phosphate	-	-	-	-	51 „
Calcium carbonate	-	-	-	-	20 „
Bismuth oxycarbonate	-	-	-	-	0 „

Sodium bicarbonate is particularly unsatisfactory as an antacid. It is soluble in water; it is irritating in high concentrations; after an initial neutralization of hydrochloric acid it causes a secondary rise in acidity to heights not previously reached; in fact it is now recognized to be the most potent stimulus to acid production known, apart from histamine. It has the further disadvantage of causing an evolution of carbon dioxide and a rise in intragastric tension, which may prove dangerous in the presence of an ulcer. It is rapidly absorbed and when used in large doses, or over long periods, may give rise to alkalosis, especially when there is hepatic or renal insufficiency. Sodium bicarbonate should not be used as an antacid in the treatment of peptic ulcer.

Magnesium oxide has about four times the neutralizing capacity of sodium bicarbonate (see table above) and does not cause an evolution of gas. It has a mild aperient action and causes a secondary rise in acidity. It is not an ideal alkali, but when used alternatively with other antacids, such as prepared chalk and the citrates, it is decidedly useful in ulcer treatment. The best preparation is the cream of magnesia B.P., of which a teaspoonful or more, according to the state of the bowels, may be given in milk feeds every alternative hour.

Calcium carbonate (prepared chalk) has about two-thirds the neutralizing power of sodium bicarbonate (see table above). It is insoluble and does not give rise to secondary hypersecretion. It does, however, produce an evolution of gas in the stomach, and it causes constipation. Its chief use in ulcer treatment is to relieve pain and heartburn, and for this purpose should be given in doses of from sixty to ninety grains. If the gastric acidity is known to be exceptionally high, a big dose may be given at bed-time or more often. The constipation may be met by increasing the dose of magnesia.

Sodium citrate.—Hurst has emphasized the value of the citrates as alkalis and has pointed out that, in combining with calcium and so preventing the direct action of rennin, it loses none of its neutralizing power. Milk itself is an efficient neutralizer, but citrated milk contains the properties of two efficient alkalis. Two or three grains of sodium citrate

should be added to each ounce of milk.

Bismuth salts.—These have been used in the treatment of gastric disorders generally and gastric ulcer in particular for over a century. They were believed to act partly as antacids and partly by forming a protective coat of insoluble powder over the ulcerated surface. Both these views have been shown by modern methods of experiment, chemical (see table above) and radiological, to be incorrect. Long experience, however, has accorded to bismuth a definite place in the relief of gastric discomfort, but at present its mode of action must be regarded as empirical. It is expensive and it is doubtful if it has any advantages over prepared chalk.

The neutral tribasic phosphates of calcium and magnesium.—These insoluble salts were introduced by Kantor in 1923 to obviate the symptoms of alkalosis associated with soluble alkalis. They are moderately effective antacids but are inclined to be irritating. Hurst has said that they do not prevent alkalosis, and further experience has shown that they are not satisfactory substitutes for the other alkalis, and their use has been generally abandoned.

Magnesium trisilicate was introduced into clinical medicine in 1936 by Mutch⁵, who has shown that it possesses antacid and adsorbent properties readily applicable to the treatment of gastric ulcer and hyperacid gastritis. Its neutralizing action continues for several hours and it does not cause alkalosis or other toxic effects, even in very large doses. Recently Mann⁶ has shown that one teaspoonful of magnesium trisilicate given hourly between feeds will prevent the appearance of free hydrochloric acid in the stomach throughout the day. He finds that its antacid effect is due mainly to chemical neutralization, but also in part to the adsorption of free acid ions by the trisilicate and by colloidal silica which is deposited. It appears very suitable for the control of gastric acidity, one teaspoonful of the substance being capable of neutralizing about two pints of $\frac{N}{10}$ hydrochloric acid, which is about the average acidity of the stomach contents. Clinical experience to date has confirmed its value and it bids fair to supplant all other alkalis in the treatment of peptic ulcer. The optimum dose is at present a matter for experiment. In ulcer cases I use a level

teaspoonful of the powder four or five times daily in addition to the sodium citrate added to the milk feeds. Considerably larger doses can be given with safety, but tend to cause diarrhoea. At present many of the proprietary forms of magnesium trisilicate, which are on the market, are quite needlessly expensive.

THE RELIEF OF PAIN.—Alkalis relieve nearly all forms of gastric pain promptly whatever their cause, but the problem is not one of simple neutralization and it seems more probable that they act partly by causing a relaxation of the pylorus and encouraging emptying and partly by the evolution of carbon dioxide, which gives rise to belching, relief being due to a fall in intragastric tension in either case. All alkalis relieve pain to some extent, but none so promptly or effectively as sodium bicarbonate. Reasons have been given for regarding it as unsuitable in the treatment of gastric ulcer, but an occasional dose for pain of exceptional severity may be necessary. In other forms of gastric discomfort sodium bicarbonate alone, or better in association with other alkalis, as in the numerous powders and tablets on the market, remains the most reliable remedy. Good formulæ are those of the National Formulary, pulv. bismuthi co., and proprietary preparations such as bisodol, cal-bis-nate, and others. It is necessary, however, to emphasize that alkalis relieve, they do not cure. They tend to mask symptoms and to produce a false sense of security. Their continued use should be dependent on investigation and accurate diagnosis.

THE REMOVAL OF MUCUS AND THE STIMULATION OF GASTRIC SECRETION.—Alkalis play an important part in the treatment of chronic gastritis associated with a diminution or absence of hydrochloric acid. The solution of mucus and the stimulating effect of carbon dioxide will often bring about a restoration of acidity in those cases which have not proceeded as far as atrophy of the mucous membrane. Sodium bicarbonate again is the most suitable alkali and is best employed in a 5 per cent. solution as a gastric lavage. In this respect it is but little inferior to hydrogen peroxide. The lavage should be continued daily until mucus no longer comes away in the washings. By this method the secretion of acid is restored in about 80 per

cent. of cases.

ACIDS

Of the dilute mineral acids only one, hydrochloric acid, remains in common use and that as a substitute in cases in which hydrochloric acid is diminished or absent from the gastric secretion. In addition to its digestive function hydrochloric acid acts as an efficient germicidal barrier to organisms swallowed in the food and saliva. For, although normal digestion is compatible with complete and permanent achlorhydria, infections of the alimentary tract especially in the gall-bladder, the appendix, and colon are liable to occur. Achlorhydria, when discovered, should always be treated with adequate doses of the dilute acid. Normally the stomach secretes with each meal an amount of acid equivalent to about four hundred and twenty minims, of dilute hydrochloric acid B.P. Such an amount cannot be given owing to its irritant action on the mouth, but one or two teaspoonfuls in a tumbler of water sweetened with sugar, orange, or fruit juice is easily tolerated and should be taken as a drink with each meal. A smaller dose of acid (twenty to twenty-five minims) is often sufficient to correct diarrhoea of gastrogenous type. When a full antiseptic action is required the larger dose must be used.

ALCOHOL

There is no reason to suppose that alcoholic drinks exert any benefit on the process of normal digestion, but in moderate concentrations (3 to 10 per cent. alcohol) they have certain effects which are useful in the treatment of dyspepsia. They contain substances, such as the bitters of beer and the aromatic esters of wines and spirits, which stimulate the taste fibres in the mouth, and excite the psychic secretion of gastric juice. In the stomach they cause dilatation of the blood vessels and a flow of weak gastric juice by a direct stimulation of the fundus. After absorption they exert a mild sedative effect on the higher centres of the brain, and they are therefore useful, more particularly in those forms of dyspepsia in which fatigue and emotional disturbance cause a loss of appetite and failure of psychic secretion. They are also of use in cases of inoperable cancer and in convalescence from illness. They should be taken

immediately before or better during meals. Thus it is better to drink sherry with the soup than in the drawing room beforehand. A glass of sherry or light wine such as claret or hock, a glass of champagne or an ounce of well-diluted whisky will promote appetite, add much to the enjoyment, and something to the digestion of a meal. In organic disease of the stomach apart from cancer, alcohol is harmful and in the treatment of peptic ulcer should not be permitted until several months of freedom from symptoms have elapsed, and then, only in the form of a light still wine or well-diluted whisky. In higher concentrations (above 10 per cent.) alcohol becomes a gastric irritant; mucus is secreted, the output of gastric juice is inhibited and the process of digestion retarded. These effects follow with much greater certainty if the alcohol is taken on an empty stomach. Within recent years social habits with regard to the taking of alcohol have undergone a change, which must be regarded with apprehension. There is nowadays much less alcohol consumed with meals and far more between meals, especially among young people. Sherry and cocktail parties (many cocktails contain as much as 30 per cent. alcohol) contain the seeds of much future ill-health, mental and physical, and an authoritative statement to this effect by the medical profession is long overdue.

CARMINATIVES

A number of pungent and aromatic substances have the power of causing the expulsion of gas from the stomach. Such are alcoholic drinks, the essential oils of aniseed, cinnamon, cajuput, cloves, turpentine and peppermint, and spices such as ginger and capsicum. It has been suggested by Plant that they act by increasing tone and contractile power. They are valuable accessories in conditions which give rise to flatulent gastric distension and afford prompt relief when symptoms are acute. The following is a useful combination:—

R.	Strong tincture of ginger	-	-	-	10 minims
	Oil of cinnamon	-	-	-	1 minim
	Oil of cloves	-	-	-	1 minim
	Oil of cajuput	-	-	-	1 minim

Dose : two to five drops, well diluted.

A turpentine enema (a half to one ounce of oil of turpentine

in a pint of soap-suds) is an established remedy for the relief of bowel flatus, and at times for the dangerous distension associated with post-operative conditions and infections such as enteric fever and pneumonia.

VEGETABLE BITTERS

Certain bitter substances are useful for stimulating the appetite either in combination with alkalis or with acids. The best known are gentian, quassia, and calumba and one or other of these substances is the basis of most mixtures designed to improve appetite. Quinine and strychnine are also used as bitters in many so-called tonics. All these substances stimulate the taste buds in the mouth and excite the psychic flow of gastric juice. There is some evidence, too, that they increase gastric tone and contractility.

ANTISPASMODICS

The drugs in this group comprise atropine, adrenaline, ephedrine and the nitrites. They relax spasm and thus the muscle tension on which visceral pain depends. Their action is either on the sympathetic or parasympathetic systems which supply the bowel, or directly on the muscle itself. Sympathetic action is generally inhibitory, and parasympathetic motor, so that stimulation of the sympathetic and paralysis of the parasympathetic will give similar results, namely relaxation. Atropine paralyzes the nerve terminals of the parasympathetic; adrenaline and ephedrine have actions similar to that obtained by sympathetic stimulation; the nitrites act by relaxing all plain muscle. According to recent theory these results are brought about by the liberation of chemical substances at the nerve terminals. Thus stimulation of the vagus or parasympathetic liberates acetyl-choline, and stimulation of the sympathetic produces a substance like adrenaline. Atropine neutralizes the effects of vagal stimulation by preventing acetyl-choline from penetrating the cells. Acetyl-choline itself is of little value therapeutically as it is rapidly destroyed in the body by ferments, but this destruction can be prevented by physostigmine.

Atropine.—Belladonna and its alkaloid atropine are the most generally useful drugs available in the field of gastro-intestinal

therapeutics. In the treatment of peptic ulcer and other dyspepsias associated with pylorospasm the action of atropine is two-fold. It inhibits the secretion of gastric juice to some extent and it relieves pain. It is usually given in insufficient dosage and in ulcer cases should be pushed until a slight dryness of the mouth is complained of. Tincture of belladonna (ten to fifteen minims), or better one two-hundredth of a grain of atropine sulphate in a teaspoonful of water should be given four times daily, with a double dose at bed-time to control secretion during the night when no alkalis are being taken. The administration should be continued until the ulcer has healed. Atropine relieves bowel colic and is of the greatest value in such conditions as lead colic, colon spasm and mucomembranous colic. Nothing is better than the regular use of small doses of belladonna combined with bromide: ten minims of tincture of belladonna and five grains of sodium bromide in half an ounce of chloroform water should be given three times daily before meals. In acute attacks of colic full doses of atropine sulphate, one-fiftieth to one-hundredth of a grain, will usually bring about relief.

Adrenaline.—The action of adrenaline is inhibitory to the muscle of the bowel and it is a valuable antispasmodic. It may be used as an alternative to atropine in cases of acute colon spasm and is occasionally more effective. An efficient dose would be five to ten minims of a one in a thousand solution injected hypodermically. It is destroyed in the stomach and is therefore useless when taken by mouth.

Ephedrine is a natural alkaloid which has an adrenaline-like action. It has the advantage of being active when taken by the mouth and it possesses a more lasting effect. On the other hand it takes about twenty minutes to act. I have found it of value in relieving the pain of colon spasm, and I know of one patient who is able to cut short her attacks by chewing a half-grain tablet. The effective dose of ephedrine hydrochloride lies between one-tenth and a half a grain. The larger dose may be associated with slight and transient toxic symptoms such as giddiness, headache or palpitation.

The nitrites cause a general relaxation of plain muscle and give temporary relief in spasmodic disorders. The inhalation

of two or three drops of amyl nitrite or the chewing of a chocolate-coated tablet containing one-hundredth of a grain of nitro-glycerin is useful in acute attacks of colic, and sodium nitrite one to three grains t.d.s. may be tried as a preventive measure.

SPASMODICS

Certain drugs such as strychnine, pituitrin and physostigmine increase the tone of the bowel; strychnine by stimulating the local nerve plexus of Auerbach; physostigmine by preventing the destruction of acetyl-choline and so enhancing the action of the parasympathetic; pituitrin by direct action on the muscle.

Strychnine and nux vomica appear as ingredients of many pills and potions in the belief that they increase the tone of the stomach and bowel. The evidence that they do so in therapeutic doses is not impressive, and their traditional value is probably due mainly to their effect on appetite.

Physostigmine (eserine) is a powerful bowel stimulant. It has been used in the treatment of severe constipation without obstruction, and especially in the prevention and treatment of post-operative distension. The dose should not exceed one-hundredth of a grain of physostigmine salicylate by hypodermic injection, and this may be repeated every four hours until six doses have been given. Its action is uncertain and it is probably safer to rely on pituitrin for this purpose.

Pituitrin.—The pressor principle of the posterior lobe of the pituitary increases the movements of the bowel and has a therapeutic value similar to that of physostigmine. In the treatment of non-obstructive abdominal distension one cubic centimetre of pituitrin or pitressin should be given every four hours up to a maximum of eight to twelve doses.

SEDATIVES

Many drugs which have a local sedative action have already been alluded to: the alkalis, the antispasmodics and the carminatives. The bromides and the barbiturates, especially phenobarbitone, are of great value for their general sedative effect in visceral neuroses, such as nervous indigestion, colon spasm, and muco-membranous colic. Quite small doses, for

example five grains of a bromide salt or half a grain of phenobarbitone three times daily are generally sufficient. For the relief of nausea and vomiting dilute hydrocyanic acid in generous dosage (five to ten minims) is useful, especially in combination with bismuth. Drop doses of tincture of iodine frequently repeated have an old-established reputation, while the following combination of chlorbutol (chloretone) and cocaine may be tried in cases of exceptional severity:

R. Chloretone - - - - - 5 grains
Cocaine hydrochloride - - - - - 1/5 grain.

Not more than three doses to be given in twenty-four hours.

Morphine has its chief use in the treatment of abdominal catastrophe, in the control of hæmorrhage, and in the relief of pain. In severe hæmorrhage morphine is indispensable; it is the one essential remedy. It allays anxiety, lowers blood pressure, and it depresses the movements of the gut. It has the disadvantage of producing spasm of the pyloric and ileo-cæcal sphincters and as a result of this sometimes produces vomiting and always constipation. In severe hæmatemesis or melæna it should be used in doses sufficient to keep the patient under its influence for twenty-four hours, or until evidence of active bleeding has passed. Morphine is essential for the relief of pain in any of the major abdominal disasters, a colic, a perforation, an acute pancreatitis or the occlusion of a mesenteric vessel. A full dose must be given to minimize shock, but its use is not justifiable until a tentative diagnosis is made and a plan of treatment decided upon. The accurate diagnosis of an acute abdomen is rarely possible if morphine has been given.

As a temporary measure in the treatment of a profuse, painful, and exhausting diarrhoea opium is superior to morphine in that it contains the alkaloids codeine and papaverine, which have a more strongly depressant action on the bowel. An opium or codeine pill, a few doses of a milder preparation, such as Dover's powder, or a few drops of laudanum combined with bismuth, will usually suffice, but in obstinate cases, and particularly in the severer forms of colitis, an enema consisting of six ounces of starch mucilage with thirty minims of tincture of opium added may prove more effective. Diarrhoea is a symptom, not a disease, and the use of opium in such cases

is to tide the patient over an emergency. It must be used with care lest by stopping the discharge of toxic material it may increase their absorption.

ASTRINGENTS

The normal mucous membrane of the bowel is protected against irritation and injury by the secretion of mucus. Some further protection can be afforded by the administration of insoluble powders, such as chalk, bismuth, china clay and charcoal, which form a thin coating over the mucosa, or by astringents, which precipitate protein and coagulate the surface of the mucous membrane. These substances reduce the absorption of toxins from the gut and some of the insoluble powders, charcoal and kaolin for example, are capable of adsorbing toxins as well. In the treatment of diarrhoea of catarrhal origin astringents have therefore given place to the insoluble powders, which are harmless and should be prescribed in large doses; for example a half to one ounce of charcoal or kaolin. Vegetable and mineral astringents, for example tannic acid and silver nitrate, are useful in weak solution for colonic lavage in the treatment of ulcerative colitis. They must be used with caution and in the acute stage are contra-indicated. The best are tannic acid, the strength being gradually increased from a half to two grains to the ounce, or albargin, an organic silver preparation, twenty to thirty grains, in a pint and a half of normal saline. They should be given at low pressure (not more than eighteen inches) and retained for fifteen minutes, the total quantity being gradually increased at each lavage. The administration should take place every other day and between successive courses of six medicated enemas there should be an interval of at least a week. Suspensions of kaolin are also used for the same purpose and have the advantage over the astringents of being non-irritating and thus more easily tolerated.

APERIENTS

It would be difficult to exaggerate the prevalent abuse of aperients, to which the advertisement columns of the press and the lists of the wholesale druggists bear eloquent testi-

mony. The bogey of intestinal toxæmia still lurks in our midst, and its corollary, the cult of the empty colon, is pursued with devotion and fervour. Yet there is no shred of evidence to suggest that harmful substances are absorbed from the colon in constipation; rather is absorption prevented by formed stools and favoured by loose ones. Certain, too, is it that the empty colon is an unphysiological state, the normal colon being filled throughout except for a few hours between evacuation and the subsequent meal.

Aperients are not, as yet, included among the dangerous drugs but are prescribed and taken light-heartedly by doctors, nurses, and laymen alike. Yet under certain conditions an aperient can carry with it a grave risk and may even determine a fatal issue. The ritual of the initial purge at the beginning of acute illness has little to recommend it. Witts, 1937,⁷ in a timely and admirable review of the subject, has pointed out that constipation in acute illness is usually a symptom of dehydration, and to purge a dehydrated patient, depleting the fluid reserves still further, is always foolish and often disastrous. The act of defæcation is exhausting, and the prognosis in a disease such as lobar pneumonia may be rendered materially worse by untimely purgation. No harm can possibly follow, provided there is no distension, even if the bowels have not been moved for three, four or five days, at the end of which period an enema or a glycerin suppository is the right treatment. Purgatives should never be given in diseases in which diarrhœa is a symptom, and only in the early stages of an acute abdominal infection is elimination by a purgative justifiable.

Routine purgation before surgical operations and especially abdominal operations is subject to similar criticism. A disturbance of the water balance of the tissues would seem hazardous at such times and must in some cases add a certain risk to the operation especially when it is likely to be attended with shock. May not this be the explanation of those disturbances of bowel function which date from a surgical operation? The use of purgatives as a routine procedure in any branch of therapeutics should, as Witts suggests, be abolished. Each patient should be considered individually, and no aperient

should be administered except on the prescription of a qualified medical man.

It is still widely believed that irritating aperients constitute the principal remedy for habitual constipation; yet the truth is that their field of employment is a small one, and that success in treatment is to be measured by the ability to dispense with them altogether. It may be noted that in the three principal types of constipation, dyschezia or rectal constipation, spastic constipation, and the so-called "atonic" constipation or sluggish colon, aperients are useless in the first named, positively harmful in the second, and play but a secondary part in the third. For practical purposes aperients may be divided into four groups: (1) saline aperients, (2) irritant aperients, (3) mechanical aperients, (4) bile.

Saline aperients.—These include the sulphates of magnesium and sodium, which have the most marked action, the tartrates of potassium and sodium, the phosphate of sodium and the citrate and oxide of magnesium. They act by hastening the passage of the contents through the small intestine so that a large volume of fluid enters the colon and produces purgation by distending it with fluid. The salines should be given well diluted and on an empty stomach so that they pass directly into the small intestine. They are unsuitable for regular use except in plethoric individuals and when there is evidence of portal congestion. They tend to produce depression in nervous individuals owing to the loss of fluid, and for the same reason they are unsuitable for debilitated or elderly persons. Their routine use at the beginning of a febrile illness is undesirable and should be discarded. The fluid stools which result from saline aperients make them especially useful for patients with hæmorrhoids, anal ulcers, and painful pelvic conditions. In dyspepsias relieved by alkalis, and particularly in the treatment of peptic ulcer, constipation is best relieved by a mild saline such as magnesium oxide.

Irritant aperients.—The principal drugs in this group are castor oil, mercury and the anthracene group. They act by irritation of the mucous membrane, peristalsis being initiated by stimulation of the local nerve plexuses. Castor oil and mercury act on both small and large intestine, the anthra-

cenes mainly on the colon.

Castor oil acts by liberation of its active principle, ricinoleic acid, in the small intestine. It is the most suitable remedy when a single evacuation is desired. This evacuation causes a complete emptying of the colon so that a bowel movement is not to be expected for a day or two after its use. This accounts for its supposedly constipating after-effects. It is often the only purgative which is effective in spastic constipation, and its use once or twice a week has been recommended in this condition by Hale-White.

Mercury.—Calomel has somewhat gone out of fashion. It is too irritating for regular use, but a single dose of from two to three grains is sometimes helpful in so-called bilious attacks in which anorexia, furred tongue, headache and constipation are associated. Its use should be followed by a saline to obviate any possibility of absorption. Calomel has a reputation in the treatment of the putrefactive type of diarrhoea, especially when given in divided doses. It is believed by some that it has an antiseptic action, but it is more likely that its effects are due to purgation.

Anthracene group.—Cascara, aloes, senna, rhubarb and the synthetic product, phenolphthalein, comprise the chief members of this group whose action is mainly on the colon. For this reason they are the most suitable aperients for regular use in the "atonic" type of constipation, and they supply the principal ingredients of the majority of proprietary purgatives. In spastic constipation they are harmful and the process of weaning patients from the purgative habit is usually the first necessity in the treatment of such cases. In "atonic" constipation one or other of these drugs is usually indispensable, and, widely used in conjunction with a suitable dietary and exercise, they assist in the re-education of the colon and in the production of a natural and formed stool. In practice there is not a great deal to choose between them, but personal idiosyncracies both as to preparation and doses are met with and it may be necessary to "ring the changes" before the appropriate drug and dose are discovered.

Aloes, aloin.—Experience suggests that aloes is the most generally useful of all this group in the treatment of chronic

constipation. It is slow in action and for this reason forms the active ingredient of most "dinner" pills. An appropriate dose of aloes or aloin combined with half a grain of nux vomica and a quarter of a grain of dried extract of belladonna B.P. in a pill to be taken with the last meal of the day is eminently satisfactory. It should not be used during pregnancy owing to its action on the uterus.

Cascara sagrada has the advantage of being available in fluid form and the optimum dose can thus be exactly determined. It has, however, some action on the small intestine and is less reliable than aloes but quicker in action. It should be taken at bed-time. *Cascara evacuant* (ten to thirty minims) or elixir *cascaræ sagradæ* B.P. (thirty to sixty minims) conceal the bitter principle and are satisfactory and palatable.

Senna is best prescribed in the form of a watery extract of the pods and the requisite number can be determined accurately. An initial dose should be six pods which can be increased or diminished until a satisfactory result is obtained. *Senna* taken in this form does not gripe.

Phenolphthalein is a synthetic production with an action on the colon similar to that of the anthracenes. It is an efficient aperient though somewhat uncertain in its action. It does not appear to have any advantages over other drugs of this type, indeed it has certain definite disadvantages. It is absorbed and excreted in the bile and is liable to produce effects over three or four days, while large doses and prolonged administration are said to produce catarrhal colitis. In spastic constipation it is particularly harmful. *Phenolphthalein* is now available in emulsions of liquid paraffin and agar-agar, for example emuls. paraf. liq. co. (B.P.C.), and should only be used for occasional administration.

Mechanical aperients act either as lubricants such as liquid paraffin, or by swelling up and stimulating intestinal peristalsis by their bulk, e.g. agar-agar and preparations of vegetable mucilage such as normacol, isogel, and coréine. They are useful for reinforcing and perhaps ultimately supplanting irritant aperients in the treatment of the sluggish colon, but their principal use is in constipation of spastic type. Liquid paraffin is non-irritating, undigestible, non-absorbable and does not

undergo bacterial decomposition. It is distributed evenly throughout the fæces in the form of globules and is an ideal lubricant. It may be prescribed as the pure oil or in one of the numerous combinations with agar-agar, though it is doubtful if this substance is present in sufficient quantity to have any material action of its own. Paraffin has the disadvantage that it sometimes seeps and stains clothing, and in some patients it causes nausea. It is therefore best prescribed for use between meals in doses of one to four teaspoonfuls according to individual requirements two or three times a day. Preparations of vegetable mucilage such as isogel may be used in place of, or in addition to, paraffin oil. They swell up and cause gentle stimulation by their bulk. The effective dose is from one to two teaspoonfuls taken with meals, and they are certainly the most generally successful of this class of aperient.

Bile salts exert a mild stimulant action on peristalsis and in various preparations have established their value as mild non-irritating laxatives. They may be taken regularly and are useful in all forms of constipation, either as sodium glycocholate (five to ten grains) in a capsule half an hour after meals or as one of the proprietary preparations of tried value such as taxol or decholin. It has been suggested that the symptoms which develop in cases of intestinal obstruction are in part due to the prevention of the passage of bile along the alimentary tract, and good results in such cases have followed the administration of enemas containing two ounces or more of bile in normal saline.

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THE USE AND ABUSE OF DRUGS IN DISORDERS OF THE LIVER

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THE liver is, in a sense, a two-fold organ. Its parenchymatous cells, with their purely metabolic function, contrast with the bile-ducts and gall-bladder, in which the muscular mechanism and absorbent vessels are more important than the mucous membrane. And yet, from the point of view of treatment, it is a mistake to divide the hepatic system too rigidly. The bile-duct cells are, embryologically, the same as the polygonal cells and it is not known, for certain, how far disease in the liver and disease in the bile-ducts are isolated. Indeed, it is known that in some instances they are very closely related: cholecystitis, for example, is not really a disease of the gall-bladder alone, but is a local, accessible and obvious part of a diffuse, inaccessible and less visible hepatitis. It is so easy to think that, because the disease is *called* cholecystitis there is nothing to treat but the gall-bladder; the rest of the liver and, indeed, of the patient, tends to be forgotten. Yet a handful of boiled sweets will often make all the difference between success and failure in the treatment of acute cholecystitis. The practitioner should take a wide view and ask himself, in the case of a biliary disease for instance, if he cannot do something to help by treating the liver cells on the one side and the digestive canal on the other.

THREE VALUABLE REMEDIES

For the treatment of the parenchymatous cells of the liver there are a certain number of drugs of known value, and a large number the efficacy of which is believed in with little or no scientific proof. Easily at the head of the list of valuable drugs comes *glucose*. This is admittedly a food, and dietetics falls outside the scope of this article, but it is more than a food to the liver; it is essential to the process of glycuronation, besides being the substance from which it derives its energy. However it exerts its remarkable power on the liver, one thing

is certain: that the liver deprived of glycogen falls an easy prey to any toxic process, and is likely to be affected by the portal zone fatty change associated with ketosis and enforced fat metabolism. It is better to give glucose as such than to rely on the patient's digestion of starchy or sweet foods. It is difficult to give too much because the patient refuses to take it when he becomes satiated; indeed the art of giving glucose is to present it in palatable forms. Sweets and barley sugar may suffice for a short time, but their appeal soon wears off, and the familiar bottle of barley sugar by the bed-side, though academically reassuring, is of little value to the invalid. Glucose-sweetened lemonade is better, made from fresh lemons, but this should be changed for other fruit drinks before it becomes tiring. It is the lemon taste which the patient comes to dislike: this can be minimized by not putting peel in the lemonade. Grape-fruit juice or pineapple juice are both admirable substitutes; orange juice is not so good because it is sweet enough already and it is important not to nauseate the patient with sweet things. It is wiser to fall short of the desired amount of glucose than to let a patient "turn against" sweet drinks. If fruit flavours pall, glucose solution slightly acidulated with citric or tartaric acid, freely diluted with soda water, may be tried; the carbon dioxide largely paralyses taste. Glucose should be given in any case of liver disease in which the polygonal cells are, or are likely to be, affected, and the amount required should be directly proportional to the risk of liver necrosis ("liver atrophy"). *The risk* is the indication, not the fact. Necrosis of the liver is too dangerous to be awaited, it should be prevented. This is not so difficult as it sounds, if it is remembered that almost all diseases of liver cells resemble "delayed chloroform poisoning," in that the clinical evidence of liver necrosis follows the actual damage after an interval; the liver is poisoned first and the patient is poisoned by the failure of the liver subsequently. Even catarrhal jaundice is a "delayed" liver disease; the damage is done during the prodromal period before the jaundice appears. Give glucose in any case in which the liver is likely, on grounds of clinical experience, to suffer, not forgetting such possible causes as passive

venous congestion in heart failure and severe cases of Graves's disease or pneumonia.

Next to glucose comes *calcium*. There is experimental as well as clinical evidence for this. There are two ways of increasing the amount of calcium available for the liver; one is to give it in a form which will be absorbed, the other, to mobilize it from the bones by giving acids. Calcium lactate is not sufficiently absorbed to be the perfect form to administer, and acidification is better avoided because the liver works best with a plentiful supply of alkalis. There are two methods of administration: the oral and the parenteral. The oral suffices for the less urgent cases, but the parenteral is the method of choice in emergencies, and has the advantage that one knows that the calcium is arriving where it is needed and in what amount. Orally, calcium sodium lactate is certainly efficient. It is best given in doses of 20 to 60 grains three times a day. Calcium chloride is a gastric irritant, but small doses of 1 to 2 grains in weak solution ($\frac{1}{2}$ to 1 per cent.) are usually innocuous. Other forms of calcium may be effective when given by the mouth, but the above are of known efficacy. By injection, calcium chloride, 1 per cent. in distilled water, may be given with care. It is dangerous to inject it rapidly, as it stops the heart, and it should take twenty minutes to give the dose of 100 c.cm. Calcium gluconate or levulinate, which may be obtained ready for injection in ampoules (10 c.cm.), is better, but even this is not fool-proof; it is easy to stop the heart by injecting calcium even in this form if it is done rapidly. A simple safety device is to use a fine hypodermic needle for the intravenous injection. It seems absurd ever to use anything else, except for blood transfusions, but there is a common prejudice in favour of "vein puncture needles" for anything to do with veins. Never inject calcium into anything but a vein: it can cause unpleasant necrosis of tissue, and even if the practitioner cannot see the necrosis of an intramuscular injection, the victim can feel it. If calcium is being given by injection, one dose a day is enough.

The other drug which seems to do good in diseases of the liver cells is *sodium bicarbonate*. Any alkali will do, but this is

the natural one and the easiest to obtain. The evidence for its value is not nearly so good as it is for glucose and calcium, but there seems to be at least clinical evidence in its favour. There is no need to make the urine alkaline; 10 grains, three times a day is enough.

INDICATIONS FOR TREATMENT

Diseases of the liver cells for which these drugs are of value are very numerous. Good examples are: *poisonings*, such as chloroform, cinchophen, phosphorus, hair dye (phenylenediamine), carbon tetrachloride and, in the presence of sepsis, not only chloroform but also ether, avertin and the barbiturates; *infections*, such as toxæmic cases of pneumonia or typhoid, and Weil's disease, yellow fever and catarrhal jaundice. Cholecystitis can be included in this group; *heart disease* such as the passive venous congestion of mitral stenosis, severe *thyrotoxicosis*, especially if complicated by sepsis, and finally any *prolonged obstructive disease* which, in time, will damage the liver cells.

The above treatment is also applicable to the tendency to hæmorrhage in jaundiced patients. Indeed it is the only proper treatment. Hæmostatic serum is clinically valueless and theoretically useless (although the patient bleeds, the blood clots excellently, as anyone who has performed a necropsy on such a case knows). Calcium is valuable not because it "acts on the capillaries," but because of its effect on the liver, the cause of the trouble.

OTHER CONDITIONS AND TREATMENT

The *itching* of obstructive and toxic jaundice can often be relieved by treatment. The simplest method is to dissolve the irritating substance out of the skin by prolonged soaking, last thing at night, in a hot bath made alkaline with two pounds of bicarbonate of sodium. This will often relieve the itching sufficiently to give a night's sleep. Thyroid extract, 1 grain twice a day by mouth, is also sometimes successful. Local anti-pruritics are disappointing because they have to be applied over so wide an area. Calamine lotion, even if not very effective, gives the patient a treatment to use when he

wants it, and prevents the helpless feeling that there is nothing he can do. Carbolic acid, 1 in 20, dabbed on to the skin with a piece of wool, is sometimes useful; I have never prescribed it, because of the risk of carbolic poisoning, but have seen three patients who have used it with impunity.

In cases of *infection* of the biliary tract drugs are often used as antiseptics. There does not seem to be any evidence that any are efficient, except hexamine, and that only in proper doses. Salicylates are often used, but are probably best avoided—they are more likely to add to the patient's discomfort than to alleviate it. Hexamine is also useless unless given in large doses; the practice of giving 10 grains three times a day, although perfectly admissable as a placebo, should not be adopted with the idea of doing any definite good: 90 to 100 grains a day are necessary if any real antiseptic action in the bile is to be expected. Such large doses would damage the kidneys unless the urine were made alkaline, and the only safe method is to give alkalis first, in large doses, until the urine is alkaline to litmus, and then to start the hexamine. It is also essential to be sure that the urine remains alkaline. This can only be guaranteed by testing it before giving each dose of hexamine, and to omit the dose unless the litmus turns definitely blue. It is also wise to omit the hexamine for two nights in the week. Hexamine cannot be expected to do good unless there is infection for it to attack; a good deal of disappointment is due to its use in biliary cirrhosis and other diseases in which it is thought that the bile-ducts *may* be infected. It is a heroic treatment best reserved for cases in which it is known that there is an infection.

Cholagogues are often used in liver disease, without much thought. Two considerations are essential. A distinction must be drawn between those drugs which increase the secretion of bile and those which empty the gall-bladder, and it must be decided whether it is wise to stimulate a diseased organ. Under the first heading there is only one group of drugs which is known to increase the secretion of bile: the bile acids. That salicylates or any other drug does so is more than doubtful. The bile acids, besides increasing bile secretion, also

increase the absorption of cholesterol from the intestine, with the solitary exception of dehydrocholic acid. If cholagogues are to be given as cholesterol solvents, this must be borne in mind. Experimentally, it is just as easy to increase the cholesterol content of an animal by feeding it on bile salts as by feeding it on cholesterol. Therefore fel bovinum, taurocholic and glycocholic acids should never be used in cases, such as gall-stones, in which the elimination of cholesterol from the liver and its appendages is desired. Dehydrocholic acid can be obtained as decholin tablets, one of which, three times a day, is an adequate dosage for ordinary purposes.

It is unwise to stimulate diseased liver-cells to secrete bile, or the inflamed gall-bladder to empty itself. There is no definite evidence concerning the effects of administration of bile-salts to a jaundiced patient: the improved absorption of food from the intestine is offset by the addition of a probably poisonous substance to the blood. The use of cholagogues is therefore practically limited to the treatment of chronic cholecystitis and gall-stones, and to the less definite disorders, in which the liver is thought to need stimulating, for which the other bile-acids are equally sound.

The drugs which stimulate the gall-bladder are fortunately not widely known; physiological stimulation has its place in treatment, but the traditional, and correct, way of helping it to empty is by the use of continued sedative therapy. The biliary tract, normal or diseased, is kept filled actively; if its muscles were entirely relaxed it would largely empty itself. The cause of retention is usually spasm. This can be relieved by tincture of belladonna,* which is not only the most useful, but also the essential part of the treatment of cholecystitis, acute or chronic. It must, however, be used properly. Like digitalis it is a drug of definite action and accurate dosage, and its use resembles more closely the surgeon's knife than the "bottle of medicine." There are two important facts about dosage: (1) a very few people are sensitive to it and cannot take it at all, and (2) there is no standard dose; some people need ten, some thirty minims to produce the same effect.

* The natural alkaloids in the tincture are much more effective than atropine.

To apply these facts (1) give a test dose of two minims. This, in a sensitive person, will produce a mild disorientation lasting an hour or two, which the patient will infallibly recognize; a larger dose would cause serious, though temporary, mania. (2) Increase the dose steadily until dryness of the mouth, difficulty in accommodation or flushing of the face show that the limit has been reached. Then cut the dose down to the point just below this level, which will exercise full therapeutic effect without discomfort, and may be given for years, if necessary, without harm. If symptoms seem to be caused, in a non-sensitive patient, by a dose of under ten minims, increase it to fifteen to make sure; those who are not used to handling belladonna are often frustrated by specious intolerance in neurotic patients. Do not be afraid of belladonna; there is far too much uninformed nervousness about it. It is certainly a "drug of addiction" in the sense that it is often difficult to persuade a patient to give it up, once he has experienced the benefit of it, but the addiction is a harmless one. There are very few cases of gall-bladder or bile-duct disease which are not improved by proper belladonna medication, and few which will do well without it.

Gentle stimulation of the biliary tract by magnesium sulphate or, much better, by olive oil, is often useful *after* oversensitivity has been controlled by belladonna, not before. Other fats, such as cream, may be used; eggs are usually too drastic. The fat may be given at any time, but it is best not to mix it with other foods; the efficacy of cholesterol-free diets depends on their automatic avoidance of mixtures of fats and starches, not on the absence of cholesterol. It is best to give the dose of olive oil, or cream, about an ounce, last thing at night. Neither olive oil nor any known drug will dissolve gall-stones *in situ*, and the use of any drug for this purpose is to be condemned. It is possible that dehydrocholic acid might, in sufficient dosage, dissolve gall-stones, but in the process they would certainly break up into small pieces, and the risk of causing an attack of colic would be very great. Fortunately all the quack, and other methods, are quite useless and therefore harmless: the employment of an efficient gall-stone solvent would be a malpraxis.

THE USE AND ABUSE OF DRUGS IN THE RHEUMATIC DISEASES

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IN the treatment of chronic rheumatism drugs play their part, but exactly what part is open to discussion. Many of the books dealing with this crippling group of diseases concentrate, from the treatment standpoint, almost entirely on physiotherapy and orthopædic measures—most important lines of treatment which should on no account be neglected—but in order to obtain this treatment it is often necessary to send a patient to a hospital, spa, or clinic where the facilities are available and expert advice may be obtained. Drug treatment can, however, be employed at home in the intervals between courses of physiotherapy and it is therefore of prime importance that its uses and abuses should be understood.

First, treatment by drugs must not take the place of orthopædic principles, such as rest and splinting combined with regulated movement in early rheumatoid arthritis, but be coupled with them and, secondly, it must be realized that several of the most potent remedies, such as gold and atophan, are extremely dangerous if handled indiscriminately.

There are a great many drugs used in the treatment of rheumatism and those of most value in rheumatoid and osteoarthritis, fibrositis and gout will be separately described. Classification of these remedies is difficult but each has its use in certain cases and it is essential to keep an open mind, not relying on one remedy and to help the patient in every possible way, correcting every associated pathological tendency. Analgesics are of prime importance not only for humanitarian reasons but to make the more drastic treatments possible and to build up the general health. Certain drugs may be looked upon in the light of specifics, but unfortunately not to the same extent as quinine in malaria and arsenic in syphilis. As such may be regarded gold in rheumatoid arthritis, vaccines in arthritis of infective origin and atophan, colchicum and piperazine in gout. Physiotherapy and protein shock is at times of value in resistant cases. Improvement may be obtained

in the general health and abnormalities corrected by diet, insulin and transfusion, iron, calcium and vitamins, and, lastly, there are miscellaneous remedies (to be mentioned)—iodine, sulphur, salicylates, salol, guaiacol and bee-venom.

Analgesics.—This part of treatment need not be looked upon as solely palliative. I have seen it the turning-point to recovery in a severe case of rheumatoid arthritis. The patient, very wasted, began to eat and sleep, started to gain weight and massage and movement became possible for the first time for many months. Of first importance is the coal tar series of compounds, and the time-honoured mixture of aspirin 10 grains, phenacetin 5 grains, and caffeine $2\frac{1}{2}$ grains, now imitated in tabloid empirin co. (B.W. & Co.), is invaluable—probably the greatest general standby there is—but it is often used in inadequate doses. The dose should be increased until the desired effect is obtained unless there are toxic symptoms—vomiting, asthma and rashes, and these are much less frequent if the bowels are kept well open. Many patients thrive on 15 grains of this mixture three-hourly.

Where aspirin itself is not well tolerated another compound of the same group will often serve—pyramidon, phenazone—but these often have a better effect when reinforced with a barbiturate as in allonal and veramon. Of the opiates morphine may be occasionally necessary in acute crisis of sciatica but codeine, $\frac{1}{4}$ to 1 grain, is of more general use. This drug is compounded with aspirin and phenacetin in veganin.

Atophan (cinchophen, phenoquin) is undoubtedly of great value between the acute attacks of gout, but it is also undoubtedly a dangerous drug. In a normal individual it lowers the threshold value of the kidney for uric acid from about 2 to 3 mgm. per cent. to zero, and seems to have a like effect in gout. It is the only drug which on a controlled diet appreciably increased the output of uric acid in the urine. There is, however, a marked idiosyncrasy, many people being able to take it in large quantities. I have seen it produce a transitory attack of jaundice on the administration of one dose of $7\frac{1}{2}$ grains, and a case has been recorded of death a month later from acute liver atrophy following only five doses on consecutive days of $7\frac{1}{2}$ grains. It should never be given except after

careful examination and questioning as to previous liver damage, and under constant medical supervision accompanied by warnings to the patient to report any digestive symptoms at once. The patient's intake should at the same time be high in carbohydrate and calcium. If its use is decided on, first a test dose of $7\frac{1}{2}$ grains (one tablet) should be given, and this is then increased to one, twice and then three times a day after food. It should only be given for three days consecutively every week and a course of two to four weeks followed by a rest for any equal period is usually best. The reason why the drug is administered in this way is that after about three days the increased excretion of uric acid begins to fall, but rises again if another course is given some four days later. This drug is certainly a great help in reducing the frequency of attacks of gout, but it must be used with the greatest care. It is one of the most dangerous drugs used in therapeutics.

Aurotherapy has been declared by some to be the greatest step of the century in the treatment of rheumatism. It certainly has a real value in the treatment of rheumatoid arthritis in certain cases, but is not free from risk unless controlled by blood and urine examinations and given with certain precautions. The type of case for which it is of most value is after the acute stage with high fever, if ever present, has subsided, any obvious sepsis has been removed, general treatment has been instigated yet improvement is tardy. It should not be used where there is kidney damage or any history of purpura.

The three gold preparations now most used are allochrysine, a gold, sulphur and sodium compound containing 35 per cent. of the first named put up in a powder form to be dissolved in ampoules of saline; myochrisin, a British preparation of rather similar composition containing 50 per cent. gold and put up in an aqueous solution (white label) and oily solution (blue label); and solganol B, a compound of gold, sulphur and glucose in oily solution. There is little to choose between these preparations, although the oily solutions are said to be absorbed rather more slowly. A safe method of intramuscular administration is to start with 0.01 gm. and work up to a maximum of 0.1 gm. by a series of weekly injections terminating the course at a total of 2 gm. After an interval of six to

eight weeks the course should be repeated, and this should not be neglected because no beneficial result has been obtained after the first course. The toxic symptoms that may result are (1) rashes, fairly common, and if not severe do not call for more than a short rest from treatment, (2) increase in pains in the joints and slight fever of no adverse significance, (3) feeling of fatigue and loss of appetite towards the end of the course may denote "saturation," (4) stomatitis, (5) albuminuria, (6) hepatitis, and (7), most serious of all, agranulocytic purpura.

These symptoms may largely be combated by starting with a small dose, careful observation throughout the whole course and also during the second course as they may occur at any time, and buffering the body with calcium and glucose injections of 10 c.cm. of 10 per cent. calcium gluconate, with each gold injection being of the greatest assistance. Injections of liver extract are also said to decrease the number of toxic symptoms. Great stress has been laid on the toxic symptoms, the reason being that this method of treatment is of such real value in the proper case, and by recognizing the toxic symptoms early and taking adequate precautions from the start, disastrous results can be avoided.

Bee venom.—The treatment of rheumatism with bee stings is by no means new, but it is only during the last few years that bee venom has been obtainable in a commercial form. The best known brand is apicosan, a German preparation, but there is a British product bee-venom now on the market. It is certainly a good counter-irritant and appears to have some general tonic effect on many patients out of proportion to its psychological effect which, of course, is large. It should be given in multiple intradermal injections of 0.2 c.cm., starting with the lowest strength apicosan-N and rapidly increasing the strength to I, II and III, unless a marked reaction is obtained. The injections may be given daily or at a longer interval, and in the dosage recommended no toxic effect, except for variation in individual sensitivity, is usual.

Calcium is frequently administered in view of the decalcification seen on X-ray examination in rheumatoid arthritis, but perhaps a greater indication is the frequent concomitant

vascular instability and cramps. It may be given in tablet form in such a preparation as kalzana or in combination with vitamin D in ostelin D, and is best absorbed from an empty stomach if there is no tendency to dyspepsia. Alternatively it may be given intramuscularly as the 10 per cent. gluconate or Crookes' colossal calcium.

Colchicum, extract of meadow saffron, is a valuable drug in the treatment of the acute stages of gout. It is also useful for administration during the early stages of physical treatment when there is a likelihood of stirring up an acute attack. It may be used as the tincture, 5 to 15 minims, as the vinum, 10 to 30 minims, or extract $\frac{1}{4}$ to 1 grain, t.d.s., p.c. or four hourly, and is usefully combined with aspirin. If full doses are used toxic symptoms are sometimes produced, the commonest of these being diarrhoea and sometimes vomiting, abdominal colic and faintness, but the latter symptoms are unusual and soon disappear on reduction of the dose. It is often used with bicarbonate of sodium to reduce these symptoms, but an adjuvant aspirin is usually preferable.

Insulin and transfusion.—A suggested course of treatment in certain cases of rheumatoid arthritis in which debility and loss of weight are prominent features is to give two transfusions of 500 c.cm. blood at a week's interval and follow this by a three weeks' course of insulin injections, starting with 5 units before lunch and dinner, and rapidly increasing to 15 units twice a day simultaneously adding one pound of glucose to the diet. This course is of value in some cases, but really needs hospitalization and aims only at improving the general health.

Intestinal antiseptics.—In view of the frequent achlorhydria in rheumatoid arthritis, acid hydrochlor. dil. 30 minims in a fruit drink with the meat meals is often of value. Other preparations used with this object in view are sulphur, salol and guaiacol.

Iodides and iodine have been used in the treatment of chronic rheumatism for as long as any remedy. The results of treatment are not dramatic but in some cases of osteoarthritis, fibrositis, and villous arthritis of the climateric it well warrants a trial. It is best given as the French tincture or as Lugol's solution, 3 minims in milk after food. If no toxic symptoms of

general depression, running from the nose and eyes or rash results, the dose may rapidly be increased to 15 minims three times a day and continued for about three weeks at a time.

Iron plays an important part in the anæmia which so frequently occurs in rheumatoid arthritis. The anæmia is frequently of the achlorhydric microcytic type and ferri et ammon. cit., 30 grains, with sod. bic., 10 grains, after meals will often cause a dramatic improvement.

Piperazine, diethylene diamine, is administered in a dosage of 5 to 10 grains, or as the effervescent granules up to 2 teaspoonfuls in the treatment of gout. It is supposed to increase the output of uric acid, but on a controlled diet the change in uric acid in the urine was not found to alter appreciably.

Pyrotherapy and protein shock are of value in certain cases of rheumatoid arthritis when sepsis has been eliminated, and general treatment and physiotherapy has been instituted without result, and when the condition of the patient is not critical, there being no fever or severe emaciation. Various substances are used for intravenous medication and T.A.B. vaccine, 100 millions in 5 c.cm. normal saline is probably the best, but it is a drastic alternative and seldom justified. For intramuscular injection 2 to 10 c.cm. milk, 1 to 2 c.cm. 4 per cent. casein or 7·5 per cent. peptone solution is used, but probably of more value and more reliable in its results is a 1 per cent. sulphur suspension in oil such as sulfosin. The injection is preceded by the use of a local anæsthetic, and the dose may gradually be raised from 0·5 c.cm. to 10 c.cm. It is desirable to obtain a fever of 100° to 103° F., and this usually occurs, if the dosage is correct, in ten to twenty-four hours and is associated with a leucocytosis. The injections may be repeated at an interval of five to seven days and may be continued for from one to four months.

Salicylates, although almost specific in acute rheumatism if administered in large enough dosage, have a disappointing effect in chronic rheumatism. They are frequently used in all types, especially perhaps in osteoarthritis, but it is often difficult to be persuaded of their value, and when relief is obtained it will usually be much more pronounced if the acetylsalicylate or aspirin compounds are employed.

Thyroid.—The results of administration of thyroid sicca can be depended on and it is invaluable when combined with dietetics in the treatment of fibrositis, osteoarthritis and the "villous" arthritis of the climateric, accompanied by obesity. It not only reduces the weight to be borne on creaking, unstable knees and hips but is also of great assistance combined with massage in clearing up fibrositis in any region of the body in these subjects.

Vaccines.—Little will be said on this subject as it is dealt with elsewhere (p. 367), but it merits a special word in relation to the treatment of rheumatism. It is definitely not a "cure all," but when septic teeth or tonsils are removed or an antrum drained, the responsible organism should be isolated and a vaccine prepared in case it is needed. It is no use wishing for it later. If in any case of rheumatoid arthritis, fibrositis or sciatica, a septic focus is found, and particularly if there is any relation between the history of onset of the focus and the symptoms, it should be removed. If, after this the condition does not rapidly improve with rational physiotherapy, then a small dose of vaccine, perhaps 10,000 organisms, should be tried. If a smart reaction is obtained the dose is reduced until the reaction is only just perceptible. If there is no reaction the dose is rapidly increased, and if none is then obtained it is best to search for some other focus or try some other therapeutic agent. In some cases a stock polyvalent streptococcal vaccine is useful and Warren Crowe uses a streptococcal and staphylococcal vaccine often alternately. In France the Pondorf vaccine is used by inunction after scarification (A tuberculin, B with the addition of staphylococci, streptococci, pneumococci and Pfeiffer B and G with the addition of gonococci). Special mention should be made of the use of detoxicated gonococcal vaccine in a Neisser infection.

It is often stated that when there are a large number of remedies for a disease none are of any value. This is hardly true of rheumatism, but it is true that none is of universal application. The manifestations of chronic rheumatism are varied, and there are probably a variety of etiologies. It is therefore essential to take a wide view of the condition and treat the sufferer from every known angle.

THE USE AND ABUSE OF DRUGS IN THE ACUTE SPECIFIC FEVERS

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THE acute stage of every infectious disease has really two distinct sets of symptoms: the one local and diagnostic, and the other general and common to all the exanthemata. For this reason much of the treatment is the same whatever the infection happens to be. Special complaints, such as the cough in measles or the headache in cerebrospinal fever clearly need special measures. Otherwise the aim of treatment is rather to deal with the general toxæmia as a whole than to concentrate on its many symptoms of headache, aching limbs, nausea, delirium, insomnia and others individually with hypnotics, sedatives, analgesics and the like. These drugs are to some extent an added poison to the body and their main function is to supplement the general treatment. This general treatment aims at the elimination of the toxins by every possible channel, because once the skin, bowels and kidneys are acting freely the discomforts of the acute stage quickly pass. If the skin is hot and dry, and the patient is constipated and passing little urine, the symptoms will continue however varied and extensive the drugging is.

In the numerous and sometimes lengthy complications of these infectious diseases general therapeutics are less successful and drugs become correspondingly more important.

SPECIFIC TREATMENT

(1) *Sera*.—Successful treatment in some of the exanthemata depends almost entirely on an antitoxic or antibacterial serum. It is unnecessary to stress the importance of antitoxin in diphtheria except to emphasize the need for early and large doses. It is hardly an exaggeration to say that the death rate rises with every hour's delay. While it is difficult to lay down absolute rules, the following suggestions may be of use:—

Mild cases	-	-	-	10,000—15,000 units intramuscularly
Average cases	-	-	-	30,000—40,000 units intramuscularly
Severe cases	-	-	-	50,000—100,000 units intravenously
Purely laryngeal cases	-	-	-	30,000—40,000 units intramuscularly or intravenously.

It is always wise to err on the side of large doses.

The outlook in cerebrospinal fever is certainly bad without repeated intrathecal and intramuscular or intravenous injections of a reliable serum. The state of the spinal fluid and, to a lesser extent, the patient must determine the need for further treatment, but three or four intrathecal doses are often necessary. It is more difficult to assess the value of scarlet fever antitoxin. This serum undoubtedly shortens the onset, reduces the general and local symptoms, and usually gives the patient quick relief. But it certainly does not prevent the complications to the extent that some enthusiasts have claimed. Scarlet fever is now a mild disease and there is an obvious theoretical objection to the use of antitoxin as a routine when it sensitizes the patient to horse serum, and interferes to some extent with the development of an active immunity. In spite of these objections, however, it has an established place in the treatment not only of scarlet fever but in the complications of other diseases such as broncho-pneumonia in measles.

Serum may be given in single or repeated doses. Scarlet fever usually responds to one administration of antitoxin, but cases of cerebrospinal fever will often need four injections, at intervals of twenty-four hours, before the treatment is complete. The membrane in diphtheria may remain stationary or continue to spread in spite of a large dose of serum and will only show signs of separating after further injections. It is usual to aim at one dose of what should be considered the maximum for that particular case, but the clinical condition must dictate any need for further treatment.

Serum, however, is not free from danger. Serious and alarming symptoms with vomiting, a rapid pulse and partial collapse can occur, while true anaphylactic shock with sudden death is not merely a theoretical possibility. These real dangers can be avoided by testing the patient's sensitivity by a small intradermal injection of 0.2 c.cm. of serum. If there is no reaction in half an hour it is safe to give the main therapeutic dose.

Desensitization, on the other hand, is generally a simple matter. The usual procedure is to give a 0.5 c.cm. of the serum subcutaneously and, if there is no reaction, to follow it in not less than half an hour with 0.5 c.cm. intramuscularly. It

is then usually possible to inject the full therapeutic amount in the ordinary way. Sometimes it is necessary to repeat this small dose subcutaneously every half hour until the reaction is minimal and then to try the effect of a similar amount intramuscularly before giving the main injection. Only exceptionally is it necessary to give the full injection of small fractional doses every half an hour.

The commonest and simplest method of giving serum is into the vastus externus muscle. Absorption from subcutaneous injections is too slow to be of much value. For severe and urgent cases intravenous therapy is often necessary as it ensures a maximum concentration of serum in the blood in the shortest possible time. This method is dangerous in asthmatics and in those who have had previous injections of serum, and, in any case, the patient should always be tested first by a small intradermal and then a diluted intravenous dose. Rigors and rises of temperature a half to one hour after the injection are common and are best treated with hot bottles, raising the foot of the bed and 10-minim doses of adrenaline.

Serum sickness, which develops a week or ten days after the injection, is rarely dangerous, but a rapid pulse, persistent vomiting and collapse can be extremely alarming in severe cases, for instance, of diphtheria. Joint pains, pyrexia, vomiting and extremely irritating urticarias that come and go with startling rapidity are enough, however, to upset the patient considerably. Adrenaline is unquestionably the most useful drug in the treatment of these reactions. Five to ten minims, according to the age, give immediate if temporary relief and counteract the collapse. Repeated doses are usually necessary and, even if their effect is short-lived, they are an invaluable standby. Local application of calamine lotion or sponging with 1 in 40 carbolic reduce the irritation of the skin a little, but calcium either by the mouth or injection is generally disappointing.

Human convalescent sera have the advantage of being quite free from these varied reactions but unfortunately are often very difficult to obtain. Passive immunization against measles is now safe and certain, and has been of inestimable value in the protection of weakly and seriously ill children.

Some of the other exanthemata are preventable in the same way. These convalescent sera have, however, a therapeutic as well as prophylactic value.

A late and severe case of rheumatism in scarlet fever illustrates this type of treatment. During the fifth week a patient developed painful swelling of most of the small and large joints, with pyrexia, cardiac enlargement and, later, typical rheumatic nodules over the elbow and along the flexor tendons. In spite of the usual intensive salicylate treatment, he grew slowly and steadily worse. There was, however, immediate improvement in three or four days after an intravenous injection of 100 c.cm. of human serum taken from a scarlet fever convalescent, and after a further dose of 100 c.cm. this time intramuscularly, a week later the nodules quickly disappeared, the joints subsided and the patient made a normal recovery. These convalescent sera may well have an increasingly important use in treatment.

(2) *Vaccines*.—Vaccines have an important use in whooping cough. They are successful prophylactically, and if given in the early catarrhal stage of the disease may modify the attack.

(3) *Drugs*.—There are few drugs used in the exanthemata or their complications that are, strictly speaking, specific. Potassium citrate makes the urine alkaline, adrenaline temporarily raises the falling blood-pressure in a diphtheritic heart failure and turpentine reduces meteorism, and in this way indirectly influence the course of the disease. But they are not curative. Mandelic acid has a specific action on a coli bacilluria occurring, for instance, during scarlet fever but such a condition is accidental and unrelated to the original infection.

Aspirin has a peculiar position. Infinitely useful in controlling widely varying pains or in instituting a very necessary diaphoresis during an attack of nephritis, it appears to have an almost specific action on the early rheumatism of scarlet fever and is unquestionably superior to sodium salicylate in the treatment of this complication. With 5- to 10-grain doses every three or four hours the temperature, pain and joint swellings quickly disappear. Children fortunately stand this drug well.

Certainly the most important recent event has been the use of the new preparation para-aminobenzene sulphonamide. in hæmolytic streptococcal infections. (See references at end of article). Buttle and Colebrook have been responsible for most of the work in this country. At Queen Charlotte's Hospital *prontosil*, an allied substance which seems to act through its conversion into this sulphonamide, has reduced the

mortality of puerperal fever from 24 per cent. to 4·7 per cent. The French workers have reported striking recoveries in apparently hopeless cases of erysipelas. The work is still in the experimental stage and there is an obvious danger from too much enthusiasm, but there have already been too many results from competent observers to leave any doubt as to the value of this new treatment.

This sulphonamide preparation has an obvious application to the treatment of scarlet fever—another hæmolytic streptococcal disease; and the record of a case recently in the London Fever Hospital, though not intended to be conclusive, is certainly instructive.

A boy of 13, on the fourth day of an attack of scarlet fever, started to run a high swinging temperature which was followed twenty-four hours later by rigors and a profuse purpuric rash on the trunk. A positive blood culture of hæmolytic streptococci confirmed the diagnosis of septicæmia. On the eighth day he was given 3 gm. of the sulphonamide daily by the mouth. Two days later the temperature was normal, the symptoms had subsided and the boy had very plainly improved. A really interesting feature of the case was a rapid return of the septicæmia when the drug was stopped after two days of normal temperature, and an immediate improvement in a few hours when it was restarted. The treatment continued, with diminishing doses, for a further ten days, and the boy then made an uninterrupted recovery.

The most striking results have been with septicæmias and infections which normally have a high mortality. But this drug has an important use in commoner and less serious conditions, such as the sudden puzzling pyrexias and secondary anginas of scarlet fever. Streptococcal infections of the tonsils during convalescence may spread rapidly to the palate, pharynx and occasionally to the larynx in spite of energetic local applications. The sulphonamide will often control the inflammation in twenty-four to forty-eight hours and, being such a simple and harmless method of treatment, is well worth a trial. Unless the drug is continued for a few days after the symptoms and signs have subsided, there is always a risk of the inflammation returning.

A case in point was a man who had a complete relapse of a very extensive faucial infection when the sulphonamide had been stopped after two days of normal temperature and an almost immediate improvement when it was re-started.

While there is a very obvious danger in looking upon this new preparation as a panacea for all evils, there is every indi-

cation that it will have an increasingly wide use on the control of hæmolytic streptococcal diseases. From what is already known of the drug, it may well have an important prophylactic as well as therapeutic value. Perhaps later other infections may be found to respond in a similar way and already experimental work has demonstrated a decided effect of the sulphonamide on the meningococcus. This is most definitely not a suggestion to use the drug indiscriminately because over-enthusiasm will bring inevitable disappointment.

The average dose is 1 gm. three times a day by the mouth. Young children will take half this amount without ill effects and adults will tolerate 5 gm. a day without trouble. Once the symptoms have subsided the treatment should continue for some days in decreasing doses till 0·5 gm. is being taken once or perhaps twice a day. There seem to be few toxic effects. Slight epigastric pain or tenderness, occasional vomiting and a slight cyanosis, chiefly of the lips, are the commonest symptoms. They rapidly disappear when the drug is stopped.

Glucose.—This is a convenient point to mention the uses of glucose which, although not a specific, has a very definite place in the treatment of the exanthemata. Symptoms of acute acidosis may occasionally develop in any of these diseases and glucose by the mouth or, if there is persistent vomiting, by the rectum or veins, will produce an immediate improvement. Its commonest use, however, is in the routine treatment of diphtheria. As part of the daily diet it can supply a rapidly absorbable form of energy. Some believe in repeated intravenous doses with insulin in the early days of hæmorrhagic and other severe forms of this disease, while it is the only food that can be given with rectal salines during the desperate sickness of cardiac failure. When the vomiting continues and the patient fails to retain his salines, intravenous glucose is the only possible method of feeding. It is essential to give injections extremely slowly as a failing heart may have difficulty in dealing with any rapid addition to the circulation.

SYMPTOMATIC TREATMENT

It is hardly out of place to emphasize again the need for treating the toxæmia of the acute stage as a whole. An airy room

with the old-fashioned but well-ventilating coal fire, plenty of fluids to drink and well-open bowels are the first necessary steps. Tepid sponging reduces temperature, controls restlessness, gently tires the patient and induces sleep. And with natural sleep and rest will come a general improvement. If general therapeutics are not enough and the acute stage is severe and long, drugs will obviously be necessary.

The antipyretic drugs have had a long innings, but they should have no place in the management of the febrile state. They have no specific action, they only temporarily reduce temperature and they may be definitely harmful. Amidopyrine, a few years ago, had a wide use as a specific in measles. The temperature, it is true, fell for a short time, but it soon recurred and the patients never improved. Pyrexia in itself is not necessarily a bad thing and is, in a way, a healthy reaction. A high temperature with broncho-pneumonia, for instance, is often a more favourable sign than a low one. The almost universally popular delight in a normal temperature is often misguided. The worst cases of diphtheria are apyrexial. Tepid and cold spongings will control hyperpyrexia more effectively and safely than any drug. If an antipyretic must be used, quinine is probably the safest.

Insomnia is sometimes a most resistant symptom. When hydrotherapy, the hot drink and sometimes a little brandy fail, a sleeping draught given in time is a great help and incidentally may prevent a habit of sleeplessness. There is no special hypnotic that acts like a charm on the exanthemata, but the mild ones are usually successful. Carbromal 10 to 15 grains, either alone or combined with 10 grains of aspirin or pulv. ipecac. cum opio, is a safe and useful drug and has no unpleasant after-effects. If worry or irritation of the skin is responsible for the insomnia, then Dover's powder is the best hypnotic, but in large doses it may sometimes cause nausea and vomiting. Aspirin and veganin are best when pain prevents sleep.

All the hypnotics, however, are effective, but it is important to see that, once they are started, the patient gets his sleep. A repeated dose of the same or some other drug may be necessary, but it is useless to give a sleeping draught and then leave

the patient to his own devices. He may then have a sleepless night and an added poison into the bargain. As a general rule the combination of an hypnotic and hydrotherapy gives the best results.

Restlessness and delirium may need something more than hydrotherapeutic measures or hypnotics. Children often react well to a small dose of aspirin with or without a few minims of nepenthe. The best drug for a wild fighting delirium is hyoscine combined with morphine $\frac{1}{4}$ grain, or heroin $\frac{1}{6}$ grain. But whereas $\frac{1}{50}$ grain will completely and safely control a strong violent patient, $\frac{1}{100}$ grain may only excite him further.

Headache and pain.—Phenacetin and aspirin have a well deserved reputation for controlling pain, but one or two tablets of veganin, with its $\frac{1}{6}$ grain of codeine phosphate, is certainly the most reliable analgesic. A mild drug that can control the agony of toothache is a real blessing. Morphine is a useful reserve for severe and intractable pain.

Constipation.—All the common purgatives have a wide use, but none of them has a selective action on the exanthemata. Calomel followed by Epsom salts in the morning is perhaps the most popular. Repeated doses of the saline purgatives are extremely useful in producing a watery diarrhoea in nephritis when there is a greatly diminished excretion of urine or actual suppression. Enemas succeed where the purgatives fail and are part of the nursing routine in diphtheria and enteric. In the one they avoid the risk of vomiting after aperients and in the other the obvious danger of purgation. An enema every other day is the correct and generally accepted treatment for constipation in typhoid fever.

Albuminuria in the acute stage, though extremely common, usually quickly disappears as the patient improves. In severe infections it may continue for some time; but in the absence of true nephritis with casts and blood in the urine, needs only an alkaline mixture and a restriction of diet. In the nephritis proper of scarlet fever, the main object of treatment is to keep the urine alkaline (with a mixture containing 20 grains each of sod. bicarb. and pot. or sod. citrate), and to relieve the kidneys by reducing the nitrogenous and fluid intake to a minimum and increasing the fluid output by purgation and

sweating. Once the patient is sweating well there is little cause for worry. Continuous dry heat, by means of an electric cradle at 115°F., will usually make the patient perspire profusely, but four or five hot-water bottles are an excellent substitute. When the skin still refuses to act, aspirin is a most useful drug in instituting and then continuing a diaphoresis. Pilocarpine has very definite dangers but is a legitimate risk in desperate cases. With uræmic convulsions venesection of anything from 4 to 15 ounces and lumbar punctures are the only possibilities. Whiffs of chloroform will control the fits.

SPECIAL SYMPTOMS

The treatment of individual symptoms is much the same as in similar conditions of other diseases. The bronchitis of measles, for instance, reacts well to an expectorant containing tinct. ipecacuanha, pot. iod. and ammon. carb., while the ordinary sedatives will control a troublesome cough that disturbs sleep. A linctus containing heroin 1/16 grain and terpene hydrate ½ grain is useful in severer cases. A benzoin inhalation soothes a laryngitis and continuous steam in a tent, in spite of theoretical objections, is the best accessory treatment for laryngeal diphtheria.

The great number of drugs still in use in pertussis is a reminder of the inefficiency of the treatment. Belladonna, the oldest and still probably the most popular anti-spasmodic, is only of value in full physiological doses and should be increased till there is dilation of the pupils and dryness of the mouth. Ephedrine is worth a trial, while the following expectorant every six hours is often useful in children.

R	Phenazone	-	-	-	-	-	-	1 grain
	Pot. iod.	-	-	-	-	-	-	½ grain
	Ammon. carb.	-	-	-	-	-	-	½ grain
	Tinct. ipecac.	-	-	-	-	-	-	3 minims
	Syrup.	-	-	-	-	-	-	30 minims
	Aq. anethi ad	-	-	-	-	-	-	60 minims

In the dangerous broncho-pneumonias of measles and whooping cough fresh air and continuous oxygen either by the rather complicated tent or by the nasal tube are the most important points in the treatment.

Local applications.—Glycerin is most deserving of mention for

its use in erysipelas. Of the many possible applications it is the simplest, cleanest and most effective. Thymol iodide has long been tried in pustular conditions of the skin that occur, for instance, in varicella.

Turpentine is perhaps the most useful drug employed in enteric. Chiefly with a soap and water enema (1 ounce to the pint) but also by the mouth, 20 minims every four hours, and as a stupe to the abdomen, it is invaluable in the control of meteorism. Calomel, salol and a free chlorine mixture are sometimes given.

Stimulants in the infectious fevers are as successful or as disappointing as in other diseases. In cardiac failure of diphtheria, a complication with a very high mortality, digitalis, camphor in oil, coramine and others seem to have little effect. Raising the foot of the bed, intravenous or rectal salines with glucose, morphine for the pain and restlessness, and three or four hourly injections of the following mixtures are the main lines of treatment:—

R	Liq. adrenalin.	-	-	-	-	-	5 minims
	Atropine sulph.	-	-	-	-	-	$\frac{2}{100}$ grain
	Strych. sulph.	-	-	-	-	-	$\frac{1}{100}$ grain
	Aq. steril.	-	-	-	-	-	to 10 minims

Alcohol.—It is almost impossible to assess the value of alcohol as a stimulant. It is a matter of opinion. Some consider it invaluable. On the other hand a greatly respected physician, with an unusually wide experience of the infectious diseases, once remarked to his house-physician (who, in defending the use of brandy on a child with a measles broncho-pneumonia, said he himself once made an excellent recovery from lobar pneumonia on alcohol), "Oh, yes, it is all right for chronic alcoholics!"

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THE USE AND ABUSE OF DRUGS IN SKIN DISEASES

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THE practice of dermatological medicine is largely governed by a full appreciation of the differences that exist between different human skins and the fact that the problem presented for treatment is often that one phenomenon superimposed on other; the treatment must be planned in stages to meet the changing aspects of the skin malady under treatment.

COMMON DIFFICULTIES

One of the most widely used preparations in the skin pharmacopœias is *calamine lotion*, of which a popular prescription is the following:—

B.	Calamine	-	-	-	-	-	30 grains
	Zinc oxide	-	-	-	-	-	20 grains
	Glycerin	-	-	-	-	-	30 minims
	Solution of lime	-	-	-	-	-	to 1 fluid ounce

The physician should every now and then sample his patient's calamine lotion. Microscopically different samples have granules of different sizes. Occasionally, even when dispensed by chemists of repute, the sediment, which should be impalpable, smooth and comforting, is gritty, and the bottleful should at once be rejected. So deservedly popular is calamine lotion that it can now be purchased in stores and chemists' shops at all prices from sixpence upwards, and is largely used by the laity before they consult their doctors. Yet it is true that every now and then a patient will be encountered who maintains that to him calamine lotion is under all conditions a skin irritant, and, if he be watched carefully, the redness and irritation that follow each application will be seen to be true, and its prescription must be abandoned. This should be carefully distinguished from the self-opinionated patient who says that

calamine lotion is no use to him, for quite often if a few drops of eosin be added to his lotion and he is told that a stronger lotion is to be employed, the hitherto useless lotion becomes at once soothing and healing.

Another extremely popular application is *zinc ointment*. To a few skins this is an acute irritant and there are many patients who know that the application of *carbolic acid* in any form and any dilution, even as low as 1 in 100, produces quickly an unpleasant, erythematous or vesicular response. An idiosyncrasy to the application of *picric acid* is well recognized, but more unexpected is the development of a blister eruption on the hands, or even a universal scaling erythema after one application of tincture of *iodine* as a first-aid dressing. Untoward effects of slight industrial accidents to the skin should always lead to an inquiry as to what treatment was applied at the first-aid station in the works.

There are two ointments containing mercury that can be purchased over the counter and are used by the public for the cure of body lice, the first is *ung. hydrargyri* and the second *ung. hydrargyri mite*, also known respectively as blue ointment and mercury ointment. The former is much stronger and, if rubbed into the pubic hair quickly produces local irritation and pustulation. It is common for chemists when asked over the counter for mercury ointment to supply the latter and weaker preparation, they recognize that the former should only be used for the treatment of syphilis under medical direction and observation. Yet to their dismay many chemists have found that the requests for mercury ointment are made on instructions from an official of the Food and Drugs Inspector of the Borough Council and they have been smartly fined for supplying a preparation not of the nature and quality demanded by the customer. This seems to be an occasion on which the professional caution and knowledge of the skilled pharmacist must be subordinated to his duty to supply a customer with what he asks for, rather than what he believes from his experience that the purchaser really requires.

Fomentations are often used for septic conditions of the skin, but their long continued use should be avoided. Indolent ulcers

are not healed by months of careful fomentation. I exclude from condemnation the just warm, loosely bandaged fomentations applied by young medical students. Furthermore, the too frequent and too long-continued fomentation of boils makes the surrounding skin sodden, and satellite new crops of boils are often the reward of the frequent hot maceration of the skin around a primary small volcano of inflammation. Fomentations are valuable, but their use is best intermittent, and the skin in between fomentations should be powdered and covered with a dry dressing, or with a normal saline or other bland compress to receive the discharges.

It is not out of place in this series to remind the practitioner of his responsibility for an occasional oversight of his dispenser. He may make a note on his prescription that the patient is deaf, he may write "sig. to be rubbed in night and morning." The patient may be stupid and inattentive and yet, not infrequently in private and in hospital practice, the dispenser is content to label the contents "to be used as directed." This is a dreadful finale to a chapter of clinical research and diagnostic acumen.

OVER-TREATMENT

Dermatitis medicamentosa is a convenient phrase to describe the unexpected results of over-treatment. It is probably most commonly met with to-day in the treatment of scabies. The cleaner type of patient met with to-day detests infestation of the skin and, when given sulphur ointment to rub in, will add flowers of sulphur to his bath, and in addition wash with sulphur soap. This ointment is best rubbed in at night and washed off in the morning. If rubbed in every night and left on from night to night for a few nights, all the scabies will be eradicated, but the patient will still itch. He will complain to his doctor of this and will be told not infrequently that his treatment has not been thorough and he should rub in the ointment for another week. His continued itch was in fact due to a sulphur dermatitis and the continued use of sulphur on the inflamed skin will produce a puzzling eczematous condition the nature of which is only realized when the skin is thoroughly rested and a bland innocuous liniment, such as

calamine liniment:—

R.	Calamine	-	-	-	-	-	35 grains
	Solution of lime	-	-	-	-	-	$\frac{1}{2}$ ounce
	Olive oil	-	-	-	-	-	to 1 ounce

dabbed on gently three times a day, when the irritable condition will speedily disappear.

A patient with psoriasis is generally accounted to have a tough skin that can be treated with some dermatological force, but a "thin" type of psoriasis which itches, and this is uncommon, is better treated with a watchful gentleness. In these cases the repeated application of chrysarobin ointment or of a strong mercury ointment is apt to be followed by a general reddening of the skin, the confluence of the psoriatic patches and development of a general exfoliation that may last for three months. This type of thin, irritable psoriatic patient will improve if put to bed for a fortnight with no skin application save soap and water, and after that any ointments that are rubbed in are better diluted below the customary strength.

DRUG ERUPTIONS

Drug eruptions were carefully studied and well described in the last century. Then a wave of therapeutic nihilism overtook medicine, largely corresponding in time with the foundation of schools of pharmacology at the great universities. As an indirect consequence of this, practitioners have become unfamiliar with the potent effects of many drugs upon the human skin and dermatologists are regularly presented with drug eruptions of which the most common are those due to arsenic, bromides, the barbiturates and to gold injections; and note must be taken to-day of the late ill-effects from radium therapy. Eruptions from the intravenous use of arsenical preparations such as herpes zoster, urticaria and extensive erythema with months of prolonged scaling, and the old type of arsenical dermatitis in the form of discrete keratoses of palms and soles or of sheets of keratoses on the same areas, still make regular appearances at dermatological clinics. In a susceptible patient three months administration of liquor arsenicalis, three drops thrice daily, may produce any of these

effects if they are not expected, and watched against. It needs emphasizing that severe general eruptions are known to follow the administration of atropine drops or the application of a belladonna plaster.

The general knowledge of bromide rashes seems confined largely to a recognition of acneiform lesions that it can produce. Large granulomatous, oval, ulcerated eruptions appearing singly or multiplying on the limbs and trunk must be thought of in terms of a halogen eruption as quickly as the much rarer mycosis fungoides comes into the mind. I have seen a nose amputated for a bromide eruption that was thought to be an epithelioma, and occasionally bromide eruptions are produced by a children's nurse who values a quiet night above a quiet professional conscience.

Eruptions produced by gold injections are easily connected by the patient himself with his treatment and the practitioner here seldom gives a further injection that increases the trouble. It is not widely known that radium used in the form of a mould or inserted under the skin in the form of gold sheathed seeds or needles will not only cause the rapid and satisfactory disappearance of malignant lesions, but may leave the skin afterwards in a fragile condition that may necrose without any ascertainable cause months later, leaving an indolent ulcer with a slough at its base that is often in error thought to be a relapse of malignancy and more radium is then mistakenly applied. When this possibility of late radium ill-effects is more widely known then the possibility of over-treatment will be naturally eliminated and the persevering application of a bland dressing will be finally rewarded by a supple, cosmetic scar.

The irritation that accompanies most dermatoses disturbs the patient's sleep and the treatment of insomnia is the associated problem in the treatment of skin conditions. Patients are often anxious, irritable and clamorous for relief. Because of their convenience and wide advertisement the barbituric drugs are very frequently used for the relief of irritation and the production of sleep. It must be remembered that the barbiturites can themselves produce eruptions. Luminal in

small doses in some cases produces long-lasting erythema, and medicinal in some produces a general redness of the skin and fever which is hard to distinguish from scarlet fever, and the lesson is only learnt when the patient develops subsequent attacks produced in a similar way by the ingestion of the same drug. On the other hand, although the medical profession is sometimes apprehensive of the use of opium, it must be recorded that opium is very well tolerated by irritable and irritating patients. The barbiturates may produce sleep followed by a dizzy head on the ensuing day from a dose of, say, 7 grains of veronal at night; but the same patient could take thirty-five drops of tinct. opii three times a day without indigestion, without torpidity, and sleep the sleep of the just, and, what is of much greater importance, will not scratch during his sleeping. In this way his itch and scratch habit is broken and the patient has moved a long way towards recovery from his pruriginous condition.

BATHS AND CLEANSING AGENTS

Cleanliness of the skin is strongly advocated by the Home Office, by Welfare Superintendents and by sanitarians. It can be purchased at too great a price. Much dermatitis in industry is produced, not by the hazard of the patient's occupation, but by the substances used to clean his skin, such as turpentine substitute and soda solution of unknown and potent strength mixed by the newest recruit to the workshop. It may seem strange to utter a word of warning against baths, but patients sometimes treat themselves with medicated baths and often produce widespread and most uncomfortable erythemas from their over generous use of cyllin or lysol in a hot bath. I once admitted a nurse's daughter who had been rubbed down before her bath with neat lysol.

PLASTERS

The use of occlusive adhesive strapping for various purposes as diverse as the treatment of impetigo contagiosa, of artificial dermatitis and varicose eczema has been an increasing feature in general practice during the last ten years. It needs emphasiz-

ing that a real idiosyncrasy to the components of the plaster does in fact exist. Patients are repeatedly seen in skin clinics whose legs are moist and irritable and scarlet from the knee to the ankle, exactly corresponding to the application of the occlusive plaster dressing, and occasionally a widespread, general, pink, macular and scaling eruption develops which is associated with the recent removal of an adhesive band dressing. Experience shows that many men are quite incredulous that such an eruption is due to the plaster. They are inclined to think more of bacterial contents of the skin exudates. In such cases one should place a small square of plaster on an indifferent area of the patient's skin and there will be, in all such cases, an erythematous and sometimes vesicular eruption, corresponding in shape to the site and size of the plaster when the piece of plaster is removed after twenty-four hours.

Such a combination of local and generalized eruption was well known to our fathers in dermatology as occasionally following the application of a belladonna plaster, and I have known most puzzling general eruptions to be due to the administration of belladonna eye drops or the application of atropine ointment by nurses when the practitioner in attendance was unaware that such treatment, prescribed long ago, was still being continued.

COSMETICS

Under the heading of preparations the use of which is harmful to the skin particular attention must be drawn to-day to the cosmetics industry. It is large enough to have evolved a literature of its own in the excellent monthly *The Manufacturing Perfumer*. A glance through any of its numbers will bring references to vanishing creams whose pearliness in use is produced by (1) triethanolamine, (2) tri-hydroxytriethylamine stearate, (3) tri-hydroxytriethylamine oleate, (4) certain proprietary emulsifiers, or (5) a combination of stearin and oleic acid. Soaps are described that contain rosin, antiseptics, waxes and copper preservatives, and there are also on the market powders, lotions, ointments and rouges that contain perfumes that may be composed of: (1) iris concrete, (2) alpha

ionone, (3) methyl ionone, (4) rose bulgarian, (5) methyl-heptin-carbonate, (6) synthetic violet flower.

Methyl-heptine-carbonate is a parent substance of an important series of artificial perfumes. The parent substance in its manufacture is ricinoleic acid from castor oil. Methyl-heptine-carbonate when pure has a remarkably sharp, penetrating and very disagreeable odour, but when diluted it has the fragrance of fresh violets. Patch tests have shown that these perfumes are, to some idiosyncratic patients, strong skin irritants. Some patients have attacks of dermatitis on Saturday night when, for a social engagement they apply special face creams. In discussing irritating perfumes eau-de-cologne must not be excluded since it may, rarely sensitize the skin where it is sprayed or dropped in careless quantity, and the exposed skin may then, without warning develop patches of deep brown, disfiguring, semi-permanent tan on exposure to sunlight.

Preparations are widely advertised now for the removal of superfluous hair and for preventing the development of an unpleasant odour from axillary sweat. A depilatory paste that may be quite safely applied to the beard may, when applied freely to a warm soft armpit, produce dermatitis and painful boils. Disinfectants, astringents and volatile oils, frequently in spirituous solutions, sold as deodorants, or perspiration preventatives are a not infrequent cause of axillary dermatitis.

It is right, however, always to remember the statement of Professor Sabouraud to the effect that he would almost prefer bad creams and bad cosmetics to none at all, for he has noticed, as have others, that the skin of actresses as a class looks younger than that of their contemporary sisters.

PROPRIETARY PREPARATIONS

The last preparations to be referred to are proprietary preparations. The quest for something new in treatments is ever present and it is a temptation pressed by the vendors upon consultants to prescribe something not at present in common use by his colleagues and by general practitioners, in the hope that what is newest is also best. The composition of such oint-

ments or injections is often undisclosed and this is a general bar to their use. But, waiving aside this objection, it is not fair without a prolonged trial under hospital observation to order in a consulting room a proprietary preparation or injection with which the user has only recently become acquainted. Ethically the patient does not pay for an experiment, and much that is advertised and prescribed to-day comes under the heading of experimental use rather than remedial use. "Toxoids" are on the market well in advance of bacteriological and clinical assent. The tested and proved preparations and substances in the pharmacopœia have long been under trial, some for centuries, and young students and residents should be impressed with the reasonableness of acquiring an experience in the use of preparations in the traditional pharmacopœia before they discard the past of which they know little for the use of the present of which they know nothing.

The treatment of a complex skin condition is determined by the fact that many skin diseases like internal diseases are often of long duration and the original condition has been complicated by scratching or by exposure to weather, or it may have been treated by strong ointments and have suffered in addition infection by micro-organisms. It is an abuse of treatment to suggest there is one remedy for this palimpsest of super-imposed phenomena. Patiently the various elements of the trouble must be unravelled one by one. The sepsis can be cleaned away by fomentations, the effect of strong treatment soothed by bland applications, the effect of scratching can be prevented by occlusive dressings, and the subjective or toxic pruritus that lies underneath it all can be removed by attention to septic teeth, discharging ears or infection of the urinary tract and by desensitizing doses of X-rays on the often well rubbed skin. The treatment of each phase needs careful and individual planning.

THE USE AND ABUSE OF DRUGS IN MIDWIFERY

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ERGOT, a drug which excites uterine contractions, has been used for the treatment of hæmorrhage in midwifery for several hundreds of years. A great deal of work has been done on its alkaloids and their function in the twentieth century. Ergotoxine was given pride of place until a few years ago, and it was stated that the *Extractum ergotæ liquidum* of the British Pharmacopœia (1914), which contained little or none, was inert. Clinicians could not reconcile this with the excellent results obtained from the use of this extract in practice. It was left to H. W. Dudley and Chassar Moir¹ to identify a new alkaloid, which they named ergometrine, as its active principle. A. K. Koff² came to somewhat similar conclusions about the same time. When given by the mouth in a dose of 0.5 to 1.0 mgm., ergometrine produced uterine contractions within eight minutes. Powerful contractions were also produced by an intramuscular dose of 0.05 mgm. to 0.5 mgm. within four-and-a-half minutes. When given intravenously 0.05 mgm. produced strong uterine action in a hundred and ten seconds, and 0.1 mgm. in sixty-five seconds. The present dosage recommended is 0.5 to 1 mgm. orally, at least 0.5 mgm. intramuscularly, and at least 0.025 mgm. intravenously. A succession of contractions "so rapid that the organ as a whole has no time to relax" occurs lasting for about an hour, followed by regular, powerful, spaced-out contractions lasting for a similar time or longer. It can be used as a routine after the third stage is complete, or for patients with post-partum hæmorrhage, in whom the rapid response to intramuscular or intravenous injection is particularly helpful.

Ergotoxine ethanesulphonate in doses of 2 to 3 mgm. causes less powerful but more prolonged contractions of the uterus, which begin thirty-five minutes or more after administration:

it may be used in the puerperium to produce this effect.

F. J. Browne³ advises that ergot should not be given for longer than five days at a time for fear of producing gangrene. It should never be used before the third stage is over, owing to its capacity to produce tonic contraction.

Pituitary extract.—Extract of the posterior lobe of the pituitary gland was first used to promote uterine contraction after the researches of H. H. Dale in 1908. Unlike ergot, it may be used in labour before the birth of the child. Since 1927 posterior pituitary extracts are required by law to be standardized, and their strength is indicated on the package and ampoules: usually it is 10 units per c.cm. There is little advantage in giving it before the cervix is half dilated, and it should not be given if any possible cause of obstruction is present: the safe dose before the birth of the child is two units,⁴ and this can be repeated after an hour if desired, the uterus being refractory to a further dose during the interval. Overdosage has been known to produce rupture of the uterus. It is given intramuscularly. It will frequently obviate the necessity for forceps delivery, and may usefully be employed in combination with any drug which has to be given but may depress the uterine action.⁵ In 1927 it was split into pressor and oxytocic components.⁶ For obstetric purposes, the unsplit product can be used, but if it is undesirable to raise the blood pressure still further, e.g. in toxæmic patients, the oxytocic component should be given. In shock occurring in obstetrics, often secondary to uterine hæmorrhage, both components are valuable. On rare occasions shock has been reported following and apparently due to the use of posterior pituitary extract: it is alleged that this does not occur if only the oxytocic principle is administered.⁷ After the third stage a full dose of 10 units may be given: some American authors advise this dose as a routine immediately after the birth of the child. I am at present following this practice in a series of cases with a view to estimating its usefulness. When given before the child is born the effects of the extract are variable: it may produce a mild tonic contraction which does not advance labour, but more often it causes an increase in the strength and frequency

of the labour pains. It is used at Cæsarean section (10 units): the effect is most rapidly produced if it is injected direct into the uterine muscle. In a severe post-partum hæmorrhage it can be injected through the abdominal wall into the uterus, and acts in about thirty seconds.⁸ A site should be chosen half way up the uterus, not too near the top to be sure of avoiding intestine, and not too near the pubes so as not to wound the bladder: it is important to empty the bladder first.

Quinine has been used as an oxytocic, mainly to induce labour in conjunction with castor oil and sometimes pituitary extract. For this purpose it is seldom effective unless the patient is near full term. Occasionally it produces death of the fœtus in utero.⁹ On this account it is not recommended. It has been advocated for primary inertia in 10-grain doses, but it is very uncertain.

Morphine is the most valuable drug in obstetrics, as in other branches of medicine: it is used as a sedative in threatened abortion, as an hypnotic and analgesic in labour, and again as a sedative in hæmorrhage from any cause, and in eclampsia. In primary inertia it is often useful in tiding the patient over a difficult time during which the pains are troublesome but ineffective. Usually she wakes up refreshed and then makes good progress. It may be given from humane motives in a single dose, or as part of the technique of twilight sleep, in association with scopolamine.¹⁰ The combination with scopolamine is advantageous even if only a single dose is given. If it is given within four hours of delivery the child may be asphyxiated or oligopnœic (i.e. the breathing is slow for some time, from a few minutes to an hour or more). It is rare for such a child to require any restorative treatment other than clearing of the air passages and a warm bath. I have never known a fatal case. Morphine alone or in combination with such drugs as chloral hydrate and potassium bromide is useful in relieving the pain due to red degeneration of fibroids during pregnancy, and thus myomectomy at this time may be avoided. It should be remembered that a woman should not be allowed to remain a whole night awake in labour for want of a suitable hypnotic.

Scopolamine was first used in obstetrics in 1902¹¹ for the

purpose of relieving the pains of labour. It was given in conjunction with morphine, this combination having recently been introduced for surgical anæsthesia. The object at first was to diminish or abolish the sensation of pain: scopolamine-morphine in large enough doses will do this. Later the subject was taken up at the Freiburg school¹⁰ and the discovery was made that the drugs would produce amnesia (forgetfulness) in much smaller dose than was necessary to bring about complete analgesia (freedom from pain). To the state in which the patient remained conscious and biddable though she rapidly forgot what was going on Gauss gave the name *Dämmer Schlaf* (twilight sleep). This is not the place to describe his technique in detail, but briefly it consisted in giving a first dose of both drugs followed by doses of scopolamine only, when necessary. He maintained, and it is true, that a practitioner skilled in the use of these drugs can use them without risk to mother or child. The main benefits to the mother are that she can look forward to her labour without fear, she forgets all pains occurring within an hour or two of the start of treatment, and she is remarkably free from fatigue afterwards; these are the advantages of all methods of twilight sleep. In the early days many bad results were reported; these were due to two things, first overdose, because attempts were made to produce analgesia, and not merely amnesia, and secondly the instability and consequent unreliability of scopolamine solutions as at first prepared. Nowadays as a rule tablets are used and the solution made fresh for each injection. Bad results included asphyxiated babies, increased incidence of forceps deliveries and of post-partum hæmorrhage, and troublesome restlessness of the mother. Skilful dosage and reliable preparations of the drugs obviate these troubles. I have not known a foetal death due to the drugs even with an overdose. The tendency to asphyxia and inefficient action of the uterus is due to overdosing with morphine. For this reason a technique was evolved later,¹² in which scopolamine only was used. It necessitated large doses, and while the liability to asphyxia was reduced almost to zero, and the post-partum loss became even less than the normal amount,¹³ the feature of restlessness became more

prominent. Three doses each of one hundredth of a grain of scopolamine are given at half-hourly intervals, and subsequently the same dose is given every two hours. More recently small doses of scopolamine have been combined with barbiturates such as nembutal and pernocton in order to produce twilight sleep.

Nembutal.—Many barbiturates have been used to mitigate labour pains in the last few years, e.g. sodium amytal, sodium soneryl, nembutal, pernocton and seconal, often associated with scopolamine. I have had personal experience only with nembutal and pernocton.

A technique involving the use of nembutal by the mouth with chloral was described in 1932.¹⁴ It is simple and suitable for use in general practice. Three grains of nembutal are given, followed by thirty grains of chloral hydrate in sweetened lemonade ten minutes later. After two hours one-and-a-half grains of nembutal are given, with thirty grains of chloral ten minutes afterwards. Then one-and-a-half grains of nembutal followed by thirty grains of chloral are given every three hours till the end of labour, provided that a total dose of seven-and-a-half grains of nembutal and one hundred and twenty grains of chloral is not exceeded within twelve hours. This is a standardized method of relieving pain, and the results as regards amnesia are not as good (complete amnesia in about 60 per cent. of patients) as when treatment is individualized, but it is not difficult to carry out. Over 800 cases have been treated at the Leeds Maternity Hospital in the last five years without serious harm to any baby from the drugs, and there has been one case of nembutal poisoning in the mother which recovered. Restlessness is occasionally troublesome.

Pernocton associated with scopolamine¹⁵ is probably the best method at present available of inducing twilight sleep. The drug is given intravenously, and I take this opportunity of expressing my disagreement with a recent statement¹⁶ that barbiturates so given have no place in obstetrics. I have now personally treated sixty-one cases with these drugs to my satisfaction.¹⁷ There has been no foetal mortality, and no trouble in the mother except pronounced restlessness in some

cases. It is important to give pernocton very slowly. I give it at the rate of one c.cm. in two minutes, i.e. at half the speed advised by the makers. It has been alleged that if the solution goes into the subcutaneous tissues it causes sloughing: I have never seen this, though I have on occasion put some outside the vein. It has also been said¹⁸ that it has no effect if given in the second stage of labour; in my experience it is very effective then. It acts more quickly than morphine, as the patient falls asleep during the injection.

Regarding twilight sleep in general it may be said that all the drugs are dangerous, and therefore require great care on the part of the practitioner giving them. If experience is acquired and due caution is used, the results are very good: this involves the expenditure of a great deal of time and trouble.

Ether was the first anæsthetic used in obstetrics on January 19, 1847¹⁹; owing to its inflammability and weight it is inconvenient for domestic practice, and it is not very suitable for use *à la reine*. When a prolonged anæsthetic is required, e.g. for forceps delivery, it is superior to chloroform owing to its lesser toxicity.

Chloroform was introduced to replace ether in November 1847¹⁹ and is still a great stand-by in midwifery. It is far from being fool-proof, but when used with "care, prayer and plenty of air"²⁰ is relatively safe. It is convenient because it is portable and not inflammable and the patient comes rapidly under its influence. It can be given *à la reine* for several hours, from a drop-bottle or preferably from a modified Junker's inhaler. It may be used in small doses to relieve the patient while she is coming under the influence of another drug. There are two main dangers in connection with its use. During induction, particularly if it is rapid, cardiac failure may occur, and this is often fatal. Also, several days after the chloroform anæsthesia poisoning may set in, with jaundice, drowsiness passing into coma, and frequently death: this delayed poisoning usually follows a large dose of the drug, but many cases have been reported in which only a small amount was used. Chloroform is entirely unsuitable for administration by the

unskilled midwife: this applies to its use in the form of capsules as well as to other methods.²¹

When it is desired to employ it *à la reine*, treatment is started towards the end of the first or at the beginning of the second stage of labour. When a pain starts, about a dozen drops of chloroform are dropped on to the mask, which is held just off the face, the mask being removed between pains. After a few pains it is found that less chloroform is necessary to produce analgesia. When the head is crowned, chloroform is given continuously until the child is born in order to relax the perineum and keep the patient quiet and completely free from pain during the actual birth. It should be borne in mind that chloroform readily burns the skin.

Nitrous oxide, the first discovered of the inhalation anæsthetics, has been extensively used in obstetrics during recent years. McKesson's apparatus for nitrous oxide and oxygen calls for an anæsthetist experienced in its use and is heavy. The gas may be administered with the pains as soon as the patient finds them irksome. When skilfully given it does no harm to mother or child and has no adverse effect on the uterine contractions. From the nature of the apparatus it is unsuitable for use outside an institution. The patient becomes completely conscious between pains, and this is a disadvantage to my mind, as her anxiety is liable to return after each pain. Minnitt's²² apparatus, by which the patient administers to herself a mixture of 35 per cent. nitrous oxide and 65 per cent. air, is extremely ingenious and gives good results provided the patient is reasonably intelligent. She is advised to take six or eight rapid breaths at the beginning of each pain. It can be used during both first and second stages of labour, but does not give adequate relief during the actual birth of the child. The British College of Obstetricians²¹ approves its use by suitably instructed midwives. Many different styles of the apparatus have been devised, and great efforts have been made, with considerable success, to overcome the difficulties of transport. It is liable to the same psychological objection as McKesson's apparatus.

Prontosil was described by Domagk in 1935 as having been

successfully used in the treatment of mice suffering from hæmolytic streptococcal infection which would normally have been fatal. L. Colebrook, M. Kenny and others^{23, 24} have recently described the successful treatment of puerperal fever in the human being by it when the infecting organisms are hæmolytic streptococci of Group A (Lancefield), i.e. those responsible for most of the fatalities. They used two compounds, *prontosil*, the hydrochloride of 4-sulphonamido-2:4-diamino-azobenzol, given orally, and *prontosil soluble*, the disodium salt of 4-sulphonamido-phenylazo-7-acetyl-amino-1-oxynaphthaline-3:6-disulphonic acid in 2·5 per cent. solution, given by intramuscular injection. They had at the time of their second paper treated at the Isolation Block, Queen Charlotte's Hospital, 64 patients infected by hæmolytic streptococci with only 3 deaths (4·7 per cent.). In 12 of the patients, including all those who died, the organisms were found on blood culture. During the previous five years, 1931-35 inclusive, the annual mortality for similar infections varied between 16·6 and 31·6 per cent. The dosage recommended in the gravely ill is 12 tablets of *prontosil* per diem by the mouth and 20 c.cm. of *prontosil soluble* intramuscularly every 8 hours. This large dosage may be maintained for a week or more if necessary, but the injections are diminished as the temperature falls and discontinued a day or two after it reaches normal limits. The tablets are reduced to six per diem as improvement occurs, and this dose is given for several days after fever has ceased. Smaller doses are given to less severe cases. In most cases the temperature drops within 72 hours, and remains normal thereafter. Complications such as pelvic cellulitis are so far unknown, and the length of stay in hospital is diminished. Mild irritation of the urinary tract may occur, and sulphæmoglobinæmia has been recorded, but only in cases also taking magnesium sulphate. The writers are convinced that the remarkable improvement in the results of treatment has been mainly due to *prontosil*, though there is evidence that there has recently been a natural decrease in the severity of the disease. The dosage is not finally fixed, nor are the routes of administration. The mode of action of the drugs is unknown.

There is no evidence that infections by other streptococci benefit from their exhibition. M. A. Foulis and J. B. Barr²⁵ have recently reported a series of 22 cases treated with success by *prontosil album*, a simpler compound, which is given orally.

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THE USE AND ABUSE OF ENDOCRINE PREPARATIONS

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WHEN Murray¹ observed that thyroid gland given hypodermically relieved the symptoms of myxœdema the physician's dream of a perfect therapeutic substance was realized. It was not surprising that this discovery should encourage the hope that similar results might be obtained with extracts of other ductless glands in cases in which their secretion was known to be deficient. The lengths to which this hope led the profession to give preparations which were inactive are, however, more startling. This error tended to grow because knowledge of the importance of ductless glands in regulating growth, metabolism and sexual development outpaced that of how to prepare active extracts for therapeutic use, and the fascinating possibilities of endocrine therapy particularly in the realm of sexual disorders glossed over the fact that many claims made had not been substantiated by controlled clinical observation or animal experiment.

Extracts of ductless glands may be given for three reasons: (1) When the normal secretion of a gland is absent or insufficient and extracts are given to replace this lack. Typical examples are the use of thyroid extract in cretinism and myxœdema or of insulin in diabetes mellitus. (2) When the physiological effect produced by a particular extract is required over and above that produced by the normally acting gland. Examples of this are the use of adrenaline to stimulate the sympathetic nerve endings and so dilate the bronchioles in asthma, or of insulin and glucose to fatten wasted patients or promote glycogen storage in toxic liver conditions. (3) For empirical reasons. An example of this is the use of parathyroid extracts and calcium by the mouth in the treatment of chilblains. Empirical treatments are often hard to justify and this is no exception. The cause of chilblains is not understood, but no constant disturbance of calcium metabolism has been shown to accompany them, and most extracts of parathyroid

gland are inactive by the mouth.

No treatment is sound which does not seek to remove fundamental causes. These can only be assessed by a close study of the patient's family history, previous history, environment and occupation with a full clinical examination and in many cases additional special investigations. Chronic infection or focal sepsis is an important predisposing cause of endocrine trouble and this is well seen in diabetes mellitus. It is bad treatment to give insulin without dealing with focal sepsis when the patient is fit for this; for, although insulin may by substitution cause the symptoms to disappear, the eradication of infection by improving the output or activity of the patient's own insulin, helps to promote real cure.

In some patients in whom such investigations leave the diagnosis still in doubt a therapeutic test giving a characteristic response may be a valuable diagnostic aid. Slight degrees of hypothyroidism which cannot be diagnosed with certainty will sometimes respond unmistakably when small doses of thyroid are given by the mouth.

When there are definite signs and symptoms of under-secretion of a ductless gland and substitution therapy is indicated the question of the physiological activity of the preparation used must be carefully considered. Merely to give an active standardized preparation is not enough unless it can be given often enough and in the right amount to replace the normal secretion which is lacking. This is difficult at present for many active preparations are too expensive to be used in full doses and all except thyroid extract are best given parenterally which necessitates frequent hypodermic injections to obtain a prolonged effect.

THE THYROID

Substitution therapy is seen *par excellence* in the treatment of myxoedema with thyroid extract. In using it there are certain precautions which should be observed especially in severe cases. The action of thyroxine is to increase the metabolic activity of the tissues thereby throwing increased work on the heart and lungs in supplying more oxygen, and on the kidneys in excreting waste products. In long-standing cases, especially in older patients, degenerative changes may be present in the

heart and blood vessels and it is therefore important that doses should be small at first in order that the new demands may be met gradually. For the same reason rest in bed may be desirable so that there may be no unnecessary calls on the heart. Occasionally patients fail to respond because their hearts have insufficient reserve power to meet the requirements of a raised metabolism. They may be compared to patients with cardiac failure treated by thyroidectomy.

The treatment of cretinism is much less successful. This may be because thyroid lack is complicated by other deficiencies, but sometimes because diagnosis is not made sufficiently early and treatment is started too late. No amount of treatment in later life will make up for lack of it in infancy when growth should be extremely rapid. Diagnosis to be made as early as possible must be based on fundamental physiological signs, such as coldness, dryness of skin, constipation and general sluggishness, rather than on the typical cretinous appearance which appears when it is too late for treatment to be effective. Once the diagnosis is made it is important for the patient to be under regular observation so that the correct dosage is maintained. The risk of under- is greater than over-dosage.

Thyroid extract may also be given whenever a general metabolic stimulant is needed and to this end has been much used for the reduction of weight. For this it is a useful adjunct but reliance should never be placed on thyroid alone. A reducing diet combined with massage and graduated exercises are the sheet anchors in treatment, with thyroid extract in addition if the first two are unsuccessful alone. Many cases of obesity in childhood, due in some cases to temporary under-activity of the anterior lobe of the pituitary gland, respond rapidly to careful dieting, and thyroid or other glandular therapy is usually unnecessary.

In prescribing thyroid, complex multi-glandular preparations which contain an uncertain amount of thyroid which is certainly active, and uncertain amounts of other ductless glands which are probably inactive, should be avoided. It is better to give a known amount alone so that its results can be more truly assessed.

Iodine and iodides are much used in the treatment of goitre,

often with little discrimination as to the type of case or the dose. Indeed the administration of iodine to any patient with goitre seems sometimes to be almost a conditioned reflex. Generalized soft enlargement of the thyroid in children or young adults may be due to relative lack of iodine either because there is insufficient iodine in the diet or because it is not properly absorbed. Such cases if the enlargement is recent often respond well to very small doses of iodine. In starting treatment one minim of Lugol's solution or one grain of potassium iodide daily is sufficient. Larger doses can be tried later if necessary but are often not required. In cases of long-standing goitre, particularly if firm or nodular, iodine is liable to induce symptoms of thyrotoxicosis. The risk of this occurring seems to vary greatly in different localities. In Vienna, for example, small doses of iodine such as may be absorbed from iodine painted on a wound cause severe thyrotoxic symptoms, an effect which is much rarer in this country. If large doses of iodine are given for long periods to patients with long-standing goitre, the gland becomes firmer from accumulation of colloid and this may in time produce pressure symptoms. In exophthalmic goitre five to ten minims of Lugol's iodine three times a day produce a remission of the disease so that the symptoms subside, the optimum phase of recovery being reached in from one to three weeks. There is then usually a gradual relapse but not to the former level of severity. By operating at the height of such a remission Plummer² showed that risk of thyrotoxic crises occurring after thyroidectomy could be almost abolished. Iodine may also be given to patients with exophthalmic goitre in smaller doses for long periods with benefit. The dose should not be stopped suddenly but gradually reduced and it should be discontinued if the gland gets very firm. It may be given for short periods before operation to patients with toxic adenoma but apart from this should usually be avoided. In assessing the value of a basal metabolism test the effect of previous iodine therapy must be taken into account.

THE PANCREAS

Although it is nearly sixteen years since insulin was discovered it is still used with too little discrimination. The diagnosis

of diabetes mellitus should be definite before diet or insulin treatment are begun or the disease may be masked. In severe cases this can be made on clinical observations alone but in mild ones, at least one blood-sugar examination taken two hours after a dose of sugar and in borderline cases a sugar tolerance curve are necessary to obviate the mistake of treating a non-diabetic glycosuric unnecessarily. The degree of impairment of sugar tolerance is, however, by itself no certain indication of the dose of insulin needed. It is impossible to compress into a few words rules for the proper use of insulin in diabetes but the following apply with few exceptions:

All patients below the age of twenty require insulin permanently and treatment with it should be begun as soon as possible after the diagnosis is made.

Most between twenty and forty years need insulin. With increasing age the disease tends to be less severe and the necessity for insulin is less urgent. Patients with clinical symptoms which cannot be perfectly controlled on a diet sufficient for their normal activity and sense of well being should take it. It is also important that some older patients who, when in otherwise good health do not require it, should be made thoroughly familiar with its use so that they may take it immediately without fuss should they develop an infection. In cases of doubt due weight should be given to the feeling of fitness and working capacity of the patient. A fit patient with a raised blood-sugar is preferable to an invalid with a normal one. In old patients especially it is unwise in many cases to attempt to keep the blood sugar normal. The patient should be treated, not the blood sugar.

When diabetics develop infections the activity of insulin is lessened and much larger doses are required to prevent ketosis. As a general rule insulin should never be reduced during an infection and should almost always be increased. If ordinary food cannot be taken glucose should be given by whatever route is possible. Most cases of coma in treated diabetes are due to too little insulin.

Diabetic coma is rare in patients over fifty; on the other hand many cases of coma from other causes also have glycosuria or even mild diabetes. If it was remembered that unless

Gerhardt's test (ferric chloride) for diacetic acid in the urine is positive the diagnosis is unlikely to be diabetic coma, much energetic treatment with insulin of comas of cerebral origin would be avoided. In using this test it must be remembered that a somewhat similar colour reaction is given by the urine of a patient who has been taking aspirin or salicylates.

THE PARATHYROID

The crude action of parathormone is to drive out calcium from the bones thereby raising the level of calcium in the blood and increasing its excretion. In cases of parathyroidectomy or spontaneous hypoparathyroidism, injections may replace the normal secretion thereby raising the blood calcium to normal and controlling tetany which is secondary to low blood calcium. Prolonged use for this purpose is, however, not usually necessary as the blood calcium can be raised to a sufficiently high level by giving extra calcium by the mouth (calcium lactate, 30 to 60 grains, t.d.s.). After prolonged use the efficacy of parathormone tends to become less. Fraser³ has emphasized the importance of treating focal sepsis in hypoparathyroidism.

In most patients, however, in whom the blood calcium is low, as in rickets, failure of absorption from lack of calcium or vitamin D in the diet is the cause. Rational treatment is to give calcium and vitamin D rather than to eliminate calcium from the already depleted bones by giving parathormone.

The demonstration by Hunter and Aub⁴ that lead stored in the bones in chronic lead poisoning can be eliminated by parathormone is an interesting example of the adaptation of a hormone for a special purpose.

Parathormone has been suggested for the treatment of hæmorrhage by raising the blood calcium. There is, however, no good evidence to show that hæmorrhage is due to lack of calcium in the blood nor has it been shown that such a rise in the blood calcium as might be obtained clinically by parathormone injections has any effect on the clotting of blood. Such a procedure is therefore without physiological foundation but is a good example of the twisting of a half truth to make a treatment.

THE SUPRARENAL GLANDS

Active preparations of suprarenal *cortex* have been found to be of considerable value in treating patients with Addison's disease and this should be combined with large doses of sodium given in the form of sodium chloride. When comparative health has been restored sodium chloride alone is often sufficient to maintain it. Results depend on the cause which has destroyed the glands for, if this is active tuberculosis or malignant disease, substitution therapy will naturally only be of temporary value. Eucortone may be used with advantage when the full Addison's syndrome is not present as is shown by the following case :

A woman of 54 was under my care suffering with toxic adenoma and auricular fibrillation. Her main symptoms were progressive vomiting, wasting, dehydration, asthenia and listlessness, and these seemed to be more than could be explained by the thyroid disorder alone. Operation was out of the question and she grew steadily worse on digitalis, insulin and glucose, and general medical treatment for four weeks during which time she lost a further stone and a half in weight which reached 5 st. 12 lb. In view of the similarity of her symptoms to those of Addison's disease I then tried eucortone. Within forty-eight hours there was a striking improvement, her listlessness disappeared, her appetite returned, and she rapidly gained weight and strength, only relapsing once during the next few months when the eucortone was stopped for a time. At the end of four months she was fit for thyroidectomy. She never had pigmentation and her blood pressure was not abnormally low.

The medulla.—Adrenaline is thought to act by exciting the myo-neural junction of the sympathetic nerve endings and may be used whenever increased sympathetic activity is required. It is destroyed by gastric juice and is therefore inactive when given by the mouth. Given hypodermically its action is transient, a fact which somewhat limits its usefulness. When a prolonged action is required ephedrine may often be used instead with good effect. The action of adrenaline in raising the blood pressure and quickening the heart should always be remembered when its use is considered in patients with cardiac disease or raised blood pressure. For the first dose two minims of a 1 : 1000 solution is sufficient. A larger initial dose may be dangerous and care should always be taken to see that it is not injected into a vein by mistake. A 1 : 100 solution sprayed with a special nebulizer in the nose or throat is valuable in asthma for the prevention and treatment of an

attack and also in allergic conditions of the nose or throat. Small doses of ephedrine are very useful in whooping cough to relieve the spasms.

THE GONADS

Knowledge of the chemical composition and functions of the hormones of the ovary and testis is advancing at a surprising rate and pure preparations of an œstrus-producing hormone, œstrone, the luteal hormone (progesterone), and the testicular principle, testosterone, have now been prepared and standardized. Their clinical use, however, is still in the experimental stage and much more accurate clinical diagnosis of the conditions resulting from such hormonal deficiencies, combined with the careful use of standardized preparations, is needed before their practical value will be known. A further difficulty is that at present such preparations are expensive. Kaufmann⁵ has been able to produce three normal periods in each of forty cases of amenorrhœa in castrated women, but for each normal period 1,250,000 international units of œstrin had to be given over a period of twelve days followed by 35 rabbit units of progestin over five consecutive days. These results are interesting not only for the light they throw on the therapy of the future, but for comparison with the claims made for oral ovarian preparations in the past.

An interesting example of the use of ovarian follicular hormone in the treatment of intermittent headache occurring at menstruation was described by A. P. Thomson.⁶ He brought forward X-ray and post-mortem evidence that in patients suffering from this complaint the diaphragm sellæ is unusually well developed so predisposing to increased intrasellar tension, and suggested that this is produced by the enlargement of the anterior lobe of the pituitary gland which has been shown to occur before menstruation. The fact that injections of ovarian follicular hormone had been proved to reduce the size of the pituitary in animals led him to use it with the same object in this condition. Two or three injections of 50 rat units of theelin were given weekly and caused complete relief in ten and marked improvement in six out of twenty-five patients.

In menstrual disorders and sterility, when ovarian insufficiency is suspected, very careful examination^{*} should be

made to exclude or treat such local causes as pelvic displacements or fibroids, and general causes such as anæmia or focal sepsis, before beginning substitution treatment.

THE PITUITARY GLAND

The full importance of the pituitary gland in initiating and regulating by specific hormones⁷ the activities of the other ductless glands has only been realized during the last few years. The activities of these principles are not clearly understood, it is not yet known which cells produce each particular hormone and the hormones themselves are of more complex structure than those of the "daughter glands," and are less easy to isolate. There is now evidence to show that the anterior lobe produces a growth principle, and gonadotropic, thyrotropic, lactogenic, diabetogenic, adrenotropic and parathyrotropic principles which influence their respective glands. Of these only the growth and gonadotropic principles are available for clinical use in a comparatively pure form and therapeutic efforts at the moment often consist in inexact diagnoses treated by impure preparations. In spite of these difficulties there is steadily increasing scope for clinical trials of anterior lobe preparations in carefully chosen cases.

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THE USE AND ABUSE OF DRUGS IN PSYCHOLOGICAL MEDICINE

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IN no other field of medicine is the use of drugs more open to abuse than in the treatment of the mild forms and early stages of mental disorder. To realize this it is only necessary to consider the steadily increasing sales of nerve tonics and patent medicines, and the fantastic claims made for them as cures for many forms of nervous disorder. A glimpse at almost any patent medicine advertisement in the lay press affords an exhaustive list of psychoneurotic symptoms ; indeed the neurotic to-day provides the main target for the skilful advertiser of these drugs. It is not surprising therefore that the hope of speedy relief throws many neurotic sufferers into the arms of those who so glibly guarantee a cure.

The harm done is widespread. In the first place thousands of pounds are put into the pockets of commercial quacks by those whose budgets are already jeopardized by their illness. Moreover, the taking of this or that remedy often postpones the day when medical advice is sought, and this delay may result in serious consequences, especially in conditions such as suicidal depressions or early cases of general paralysis of the insane which require urgent treatment. In addition, the remedies themselves may be injurious when taken to excess; and the failure of the promised cure may shake the patient's faith in any further treatment that may be offered him.

It is unfortunate that when the "nervous" patient consults his doctor he may sometimes fare but little better, for drugs are so often given to such a patient without any attempt at an

adequate physical and mental examination. The practitioner is too busy or it may be he is not interested in psychological disorders; but the busiest physician would hesitate to prescribe for a severe physical illness without first examining the patient, and the same caution should be exercised in dealing with even the mildest forms of mental disorder. Many psychiatric patients, however, are quickly dismissed from the consulting-room with a bottle of medicine and a well-worn platitude.

It may be some time before the practitioner comes to realize the dangers of the "placebo," but an unexpected suicide (in a case of post-influenzal neurasthenia, for instance) will make him appreciate that a brief psychiatric examination would probably have elicited the suicidal tendency which could then have been guarded against. In such tragedies the giving of drugs may indirectly cause a patient's death when used as a short-cut to the dismissal of the case rather than as an adjunct to a definite line of treatment, once the condition has been fully investigated. There is another type of case in which the mere giving of medicine may do much harm. In anxiety states or mild depressions due to some easily discoverable psychological cause, failure to institute prompt psychological or social treatment may result in the neurosis becoming so chronic that curative treatment becomes much more difficult.

Some practitioners may pride themselves on their skill in the drug treatment of the "nervous" patient, for many of their cases make good recoveries with drugs alone. Indeed, compared with the general run of serious medical diseases, the results obtained may appear highly satisfactory. This, however, is largely attributable to the little realized truth that remission or recovery is common in mental disorder without any special treatment being given. Success therefore cannot readily be ascribed to any specific drug or type of therapy. Moreover this high natural recovery rate makes assessment of the value of all forms of treatment (physical, social and psychotherapeutic) a matter of extreme difficulty even under carefully controlled hospital conditions. "*Vis medicatrix naturæ*" often does more for the patient than any help the practitioner can

offer.

SPECIFIC USE OF DRUGS IN ORGANIC PSYCHOSES

Contributors to this symposium who are discussing drug therapy in purely physical illness have at their disposal a greater knowledge of the pathology of disease than is yet available to the psychiatrist. Effective drug treatment largely depends on a knowledge of the etiology and pathology of the condition to be treated. In the field of mental disease, owing to its delayed acceptance into the realm of general medicine and because of the inherent difficulties of the subject, too little is known of the organic changes that accompany mental disorder. In those few conditions, however, in which a physical basis is known, drugs can be used in a rational and scientific way with a fair measure of success.

Mental disorder associated with *myxædema* is probably the best example of this group. The symptoms vary from lassitude, apathy and mild retardation to gross confusion and deep depression with paranoid delusions. Treatment with thyroid is usually so successful that every psychiatrist rejoices when he sees a myxædematous patient walk into his consulting room. In other patients the underlying cause of the symptoms is to be found in the blood picture. *Microcytic anemia* may be accompanied by lassitude, much anxiety and hypochondriacal symptoms of all kinds. Before the introduction of massive iron therapy little could be done for these so-called "neurotics" but now it is most gratifying to observe the symptoms receding into the background as the hæmoglobin percentage gradually improves. Severe mental symptoms, including delusions and hallucinations, sometimes complicate the *macrocytic anemias*: they may accompany subacute combined degeneration of the cord or even precede it. Treatment by liver is sometimes successful, but like the treatment of subacute combined degeneration the results are not so good as in uncomplicated pernicious anæmia.

Syphilis of the brain provides another example of mental illness with a known physical pathology; moreover its treat-

ment by drugs can be scientifically controlled by biochemical tests of the cerebrospinal fluid. Although in general paralysis of the insane (parenchymatous syphilis) malarial therapy is the first line of attack, recent work has shown that a prolonged course of weekly injections of tryparsamide (3 grammes) should always be started immediately after the malaria has been terminated. Injections should be given until the Wassermann reaction in the cerebrospinal fluid becomes negative. Two or three years of treatment may be necessary to achieve this. Tryparsamide is also used alone when malaria is thought to be dangerous owing to the patient's physical condition. In rare instances this drug has been reported as causing optic atrophy and therefore the fundi should be examined periodically during its use; if vision begins to fail or signs appear in the disc the drug must immediately be discontinued.

In "cerebral syphilis" (interstitial syphilis) both the mental picture and the treatment are different. The onset is often sudden with confusion or delirium, and cranial nerve palsies and apoplectiform fits commonly occur. The Wassermann reaction in the spinal fluid is often negative and the gold curve luetic. It is important to distinguish this condition from general paralysis as malaria is not recommended by most writers while injections of N.A.B. are considered preferable to tryparsamide. Mercury and potassium iodide should also be used to supplement the treatment. In selected cases the results obtained are often more satisfactory than in general paralysis of the Insane.

It is unfortunate that knowledge of the organic changes in mental disorder is still so limited but it is to be hoped that progress will be less slow than in the past. In particular, endocrinological researches are likely to bear fruit in the psychiatric field for it is evident that many of the nervous breakdowns that occur in the involutional period are closely associated with endocrine dysfunction. The association between anxiety states, overaction of the sympathetic system and thyroid hyperfunction also call for further investigation; and there is evidence suggesting that the syndrome labelled "anorexia nervosa" may sometimes be dependent on anterior

pituitary deficiency. It is yet too early to assess the effect of endocrine preparations on such conditions although favourable results have already been reported. Other organic states producing mental disorder and responding to drug therapy include vitamin deficiency diseases, drug intoxications, and the sequelæ of encephalitis lethargica.

TREATMENT OF STATES OF MIXED ORIGIN

In addition to the organically determined mental illnesses there is a large group in which both physical and psychological factors appear to play a part. An exceedingly common instance of this is to be seen in the case of a person suffering from temporary physical debility who breaks down under psychological stresses which would leave him untouched when in normal physical health. Another example is provided by cases of hyperpiesia accompanied by much anxiety and irritability, symptoms which themselves tend to cause a rise in the blood pressure. In such syndromes it may be impossible to discover whether the primary cause is mental or physical, but the final product is often a vicious circle. Treatment must obviously be directed to both sides of the illness, and to obtain a satisfactory result drug therapy must be supplemented by adequate psychological treatment.

Conditions of this sort illustrate clearly the peculiar difficulties of psychiatric treatment, embracing as it does problems of the interrelation of mind and body. Why, for instance, is an idiopathic epileptic fit (in a case of undoubted epilepsy) precipitated on occasion by an emotional disturbance? Again, why is a depressive psychosis, with measurable physical concomitants, often precipitated by purely psychological factors, while an exactly similar mental state may also occur as an endogenous non-psychologically determined disease? There is still so much that is obscure in psychiatry that except in the few conditions known to be either wholly organic or wholly psychogenic in origin, treatment must be directed to the whole patient. This statement has already become a platitude in general medicine, but in psychiatry where it should be a

definitely accepted maxim, many of the psycho-analytically minded avoid drugs like poison, and many organicists are equally derisive of psycho-pathological truths.

DRUG TREATMENT OF SPECIAL SYMPTOMS

At some stage or other during most mental illnesses drugs are needed for the relief of special symptoms. It is obviously impossible to deal with all of these, but a few of the more important will be briefly considered. Insomnia, for instance, is commonly present and should never be ignored. If simpler remedies fail, the early use of hypnotics is recommended; it is necessary to emphasize this as many doctors withhold hypnotics for as long as possible. They should be given before sleeplessness has become a habit. The barbiturates are generally recognized by most practising psychiatrists as the most useful form of hypnotic. Medinal (5 to $7\frac{1}{2}$ grains) is excellent and can be taken with safety for weeks at a time except in patients who are severely debilitated or acutely ill with some physical condition. Idiosyncrasy is extremely rare. Recently good results have been obtained with another barbiturate, sodium amytal; the usual dose is 3 grains, but in healthy subjects twice that amount may be given with safety; it is absorbed and excreted more quickly than medinal and its action is therefore more rapid. It is hoped that the recent drug regulations (May, 1936) will not lead to a lessened use of barbiturates under medical supervision.

The whole subject of the use and abuse of sedatives is being dealt with in this symposium in a special article but it will be well to touch on the specific use of bromide in mental disorder. Anxiety, agitation, and mental overactivity are the most clearly defined symptoms which are undoubtedly relieved by this drug, but it is used in England indiscriminately and carelessly without realization of the possible dangers which in psychiatric practice appear far more real than those attributed to the barbiturates. In elderly patients and those who have arteriosclerosis, cardiac or renal disease, or whose diet is poor in salt, bromide readily accumulates in the blood and tissues

so that harmful intoxication may result. The symptoms vary from lassitude and anorexia, inability to concentrate and failing memory, to a stuporose state or a delirium with alarming hallucinations. Acneiform rashes do not often accompany the more severe intoxications and the diagnosis is therefore missed, a mistake which may result in the unnecessary certification of the patient. If the condition is suspected sodium chloride (30 to 40 grains t.d.s.) should be given together with ample fluids, and the bromide should be omitted. Rapid improvement will take place if a true intoxication is present.

The symptoms of acute fear and anxiety, which are typically seen in the sudden "anxiety attack," are difficult to treat without a powerful sedative such as morphine which it is unwise to give except under hospital conditions. It is, however, becoming increasingly clear that the somatic manifestations of such attacks—tremor, palpitation, sweating and dilated pupils—are symptoms of sympathetic overactivity, and it is hoped that before long, drugs with a selective action on the autonomic system will be produced capable of relieving the "acute anxiety attack" in the same way as adrenaline is now used for asthma. Derivatives of acetylcholine which stimulates the parasympathetic system are already being tried, but so far without much success owing to their rapid destruction in the body.

Constipation is another common symptom and it should be treated along general lines. The delusion that the bowels are completely blocked is often present in melancholia but this must not be allowed to interfere with the treatment of the obstinate constipation that may have given rise to it. In the convalescent stage of a nervous breakdown general tonics, such as Easton's syrup, are often useful. The actual tonic prescribed, however, seems of less importance than the therapeutic suggestions that accompany it. There is much truth in the adage "it is not what you give but how you give it that really matters."

DRUG TREATMENT OF SCHIZOPHRENIA

The drug treatment of schizophrenia is so unsatisfactory that

any new method introduced is eagerly tried. Most remedies, however, enjoy only a short-lived popularity. In recent years such varied drugs as sodium chloride by infusion, sodium nucleinate, testicular extracts, and the intramuscular injection of pyrifer which produces an artificial pyrexia, have been advocated, but so far none of these treatments has obtained general acceptance. During the past year success has also been claimed in Vienna by treating recent and acute cases with the "insulin shock" method. Severe hypoglycæmic reactions are induced by large doses of insulin, given intramuscularly and repeated on successive days. A 70 per cent. remission rate is claimed, though it must be remembered that in cases having an acute onset a natural remission rate up to 40 per cent. may be expected.

DRUG TREATMENT OF MANIC-DEPRESSIVE STATES

In the treatment of certain forms of hypomanic excitement and depression in which there is much restlessness, the production of "continuous narcosis" by repeated injections of somnifaine has proved of definite value. The usual duration of a course of treatment is from ten to fourteen days and, now that the technique has been improved, dangerous toxic symptoms can generally be avoided. It is, however, a method of treatment that should only be attempted under hospital conditions. In America sodium amytal is now often used instead of somnifaine as it is less toxic and can be given by the mouth. In Germany severe depression is treated by tincture of opium. A small initial dosage of 5 minims is slowly increased to about 15 minims t.d.s., and then gradually lowered. Great symptomatic relief is reported and addiction rarely occurs as the patient does not know what drug he is receiving.

Benzedrine, a sympathetic stimulant allied to adrenaline, has recently been introduced into therapeutics. Work already done at the Maudsley Hospital suggests that it may be of value in a limited number of depressive illnesses. It is given by mouth in doses varying from 10 to 30 mgm., according to the patient's individual susceptibility. As it may cause sleepless-

ness it should not be given late in the day. In the severe depressive states, accompanied by delusions of unworthiness and wrong doing, it is of little value; but in the milder forms showing lethargy, retardation of thought, and inability to face worrying situations, it may be a considerable help. Those who are benefited report a feeling of increased confidence, and even euphoria, and are able to tackle problems that previously seemed impossible; yet judgment is not impaired as is the case after taking alcohol. Unfortunately repeated use sometimes results in lessened effects, and it is therefore best reserved for mild depressions and the final stages of recovery in the severer illnesses. Benzedrine can also be used as an aid to psychotherapy as patients can more easily discuss their problems under the influence of the drug.

CONCLUSION

From this short review of the drug treatment of mental illness it will be realized that at present both the range of drugs and their sphere of usefulness is indeed limited. In some ways this is not entirely to be regretted, since ignorance of organic pathology on which to base rational drug therapy has forced careful investigation of the mysteries of psycho-pathology. One result has been the accumulation of much valuable knowledge of the emotional stresses that precipitate mental illness, and this can be put to good use, not so much perhaps in the treatment of the fully developed breakdown as in its prevention. Clinical and biochemical investigations, however, are slowly demonstrating definite physical changes in many types of mental illness. There is every reason to think that when their nature is more precisely understood, drug treatment will be used with increased success.

THE USE AND ABUSE OF DRUGS IN DISEASES OF THE EYE

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"Treatment in 'Eyes' is easy—you only order boracic lotion or atropine except, of course, in glaucoma."

THE jest may insult the ophthalmologist, and yet it embodies so much of the truth that perhaps the ophthalmologist might retort that given the correct diagnosis, much abuse in the drug treatment of eyes could be avoided if the jesting advice were always followed. Drugs employed for the treatment of diseases of the eye may be roughly divided into those for local application (1) for lesions of the conjunctiva and lids when excess of secretion is a marked feature, (2) lesions of the eyeball and its contents for which mydriatics are principally used except when raised intra-ocular tension demands the use of miotics; and drugs not applied locally, but given in some cases for the general good of the patient—in other cases with a view to direct response in the eye. The effects aimed at by the drugs for surface inflammation are mechanical, antiseptic, astringent, and in a few instances "specific" for some particular lesion. They may be used in the form of lotions, drops, powders, ointments and oils.

LOTIONS

Possibly the most valuable effects of a lotion lie in the purely mechanical washing away of the excess of secretion and the products of inflammation. For this purpose alone normal saline solution may be used, but generally some active antiseptic or astringent solution is employed such as boracic acid (2 to 5 per cent.), mercury perchloride 1 in 8,000, or oxy-cyanide 1 in 10,000 or zinc sulphate. The value of the antiseptic solution has been considerably questioned—the drug must be in concentration sufficiently weak not to damage the tissues, and it is further reduced greatly in strength by mixture with the tears and fluid of the conjunctival sac. Thus the value of a weak solution only momentarily in contact with an infected conjunctiva may be low. Furthermore, the use of local

drugs has been shown to inhibit the production of the conjunctival enzyme which has considerable bactericidal power. The antiseptic quality of a lotion does, however, appear to aid its mechanical value in the irrigation and cleansing of the whole conjunctival sac—a most essential procedure when inflammatory products accumulate in any quantity. When a lotion is used more for its astringent properties, for instance $\frac{1}{4}$ per cent. zinc sulphate in a weak boracic solution, considerable abuse may arise from too prolonged usage. The cause of a chronic conjunctival hyperæmia may be overlooked, and a chemical irritation of the conjunctiva well established. Even a weak boracic acid solution may cause irritation of the lids which become progressively more inflamed, a state of affairs which unrecognized may lead to the use of stronger solutions “to cure the chronic conjunctivitis.”

DROPS

As drops, or for painting the conjunctival surfaces of the lids, silver nitrate ($\frac{1}{4}$ to 2 per cent.), or protein silver preparations—argyrol, protargol—are freely used. They have a real value in forming a coagulum from the inflamed surfaces which, if washed away by lotion shortly after the application of the silver salt, carries with much infected and necrotic tissue. The value of these preparations for prophylaxis against ophthalmia neonatorum is universally known. Abuse arises if such drugs are used for too long a period, since not only may the irritation previously mentioned be established, but worse still, a permanent brown staining of the conjunctiva may be produced—certainly by silver nitrate solutions if not by some of the protein preparations. For this reason the dispensing of these drugs in chronic conjunctival inflammation should be carefully controlled.

A number of drugs (such as mercurochrome (1 per cent.) and acriflavine 1 in 1,500) based on the benzene ring have recently been highly praised as conjunctival antiseptics of high potency yet causing little local damage. They have the disadvantage, however, in many cases, of staining the skin, and thus cannot always be given to the patient for home use.

Optochin (1 per cent. drops) is a quinine derivative used

for pneumococcal infections of the conjunctiva which are so much more commonly seen in this country than was formerly the case. Experimentally its effect is very striking, but this is not always borne out in practice, and the application is distinctly painful.

For the common angular type of conjunctivitis caused by the Morax-Axenfeld bacillus, zinc sulphate ($\frac{1}{4}$ to $\frac{1}{2}$ per cent. drops) is specific, but the drug should be discontinued as soon as the inflammation is past.

Copper sulphate drops ($\frac{1}{4}$ per cent.) are sometimes used as a general astringent, but this salt is used mainly for trachoma, in which condition the solid crystals may be applied to the active lesions on the palpebral conjunctiva. Its use is, however, much more confined now than it was in the past to definite phases of the disease, and real abuse may arise from ill-timed application.

In addition to the above "specific" drugs, certain chemicals are used for burns of the surface of the eye—weak acids, e.g. 1 per cent. acetic acid, or boric lotion for alkaline burns, and sodium bicarbonate (2 to 4 per cent.) for acid burns.

For the dangerous lime burn of the eye 10 per cent. neutral ammonium tartrate as a daily wash produces excellent results although an early irrigation of the eye with a saturated solution of glucose has been found to be equally effective in limiting the caustic action of the lime.

POWDER

Finely divided calomel powder dusted into the conjunctival sac daily for three or four days makes an excellent antiseptic and its value is especially seen in the severer forms of phlyctenular ophthalmia. This method of applying a mercury salt probably keeps an antiseptic solution, of effective strength, longer in contact with the surface of the eye than is the case in which a lotion is used.

OINTMENTS

Ointments serve a dual purpose in surface inflammation. First the mechanical function of preventing, at least in some degree, the sticking together of lids during sleep when con-

junctival secretions are drying and crusting on their margins. For this important purpose sterile vaseline or boracic ointment (2 per cent.) serve excellently. Secondly the ointment may act as the vehicle for an antiseptic drug—diffusing it from the lid margins over the conjunctiva more slowly than in the case of a fluid vehicle. Ichthyol (1 to 5 per cent.) in zinc ointment (2 to 5 per cent.) is used for chronic conjunctivitis or blepharitis in this way, but in this country mercury salts are chiefly used, e.g. the yellow oxide ($\frac{1}{2}$ to 2 per cent.) or ammoniated mercury (2 per cent.). Abroad many other metallic salts are used in ointment form for antiseptic and astringent purposes.

Ointments have the disadvantage of being “messy” in use, and excess allows a dust collecting layer to cover the lid surfaces and margins. As a result, acute infections of the hair follicles and lid glands are not infrequently seen when ointments are being used. The mercurial ointments are distinctly irritant, and considerable abuse of their application may arise when for instance a conjunctiva, already inflamed and irritable, is heavily treated by yellow oxide of mercury ointment when all that is required is the mechanical action of a bland ointment to prevent the sticking of lids by dried secretion.

OILS

Oils, e.g. liquid paraffin or castor oil, are used as lubricants and emollients, but an antiseptic, e.g. acriflavine, is sometimes used in an oily medium. Cod- (or halibut-) liver oil has been used as local drops—recently extensively—in surface conditions of the eye, chiefly for corneal ulcerations, much as they have been used in skin ulceration. Glowing reports have been published about their value in many types of surface activity, and as these high-vitamin content oils seem to be at least harmless, they have been tried in all sorts of conditions which respond badly to other forms of treatment. There is some ground for thinking that prolonged use induces irritability, but this may be due to free acid in a bottle of oil kept in use for some weeks.

DRUGS USED LOCALLY

When the drugs for lesions of the eyeball are reviewed, the mydriatic group forms the largest and most frequently

employed type. They are used for examination of the interior of the eye—then acting also as cycloplegics for estimation of refraction—for inflammations of the cornea, uveal tract and sclera—following intra-ocular operations and many traumatic lesions. Atropine, usually as the sulphate in aqueous or oily solution, or as an ointment—to a maximum strength of 2 per cent.—is perhaps the most generally used mydriatic, and cycloplegic. By its use the eye is “put to rest” as iris and ciliary muscle activity is stopped. Thus pain is reduced in many conditions. The widened pupil prevents adhesions of the iris to the anterior surface of the lens. Lachrymation is noticeably reduced, and spasm of the lids lessened. Its effect is more prolonged and more intense than that of other mydriatics, and when such an effect is desired, atropine is used although several points should be clearly kept in mind so that abuse may be avoided. Foremost perhaps is the risk of inducing an attack of acute glaucoma in a predisposed individual. Such catastrophes are rare, but the risk must always be borne in mind with patients in middle and later life. If the condition demands atropine, the risk may be taken unless the patient has a shallow anterior chamber or would seem to have a full or raised intra-ocular tension. If there be doubt, homatropine (2 per cent. as hydrobromide) may be tried, and its effects upon intra-ocular tension watched. A miotic will counteract the effect of homatropine much more readily than that of atropine. In young children in whom atropine is used as a cycloplegic for refraction work or for other purposes, its toxic effects must be borne in mind as the drug readily passes into the circulation by way of the nasolachrymal duct and the nasopharynx. Used over a long period, atropine not infrequently induces a follicular form of chronic conjunctival irritation which will only clear up when the drug is stopped. This is not to be confused with the well-recognized “atropine irritation”—an individual intolerance of the drug when even one drop of a weak solution may produce a local eczematous reaction or even a miliary skin reaction involving large areas of the body. The condition is not clearly understood, but the drug cannot be used in individuals who respond in this way. The employment of atropine in a purely conjunctival condi-

tion must be considered an abuse, for it serves no useful purpose, and may readily add to the local irritation.

When atropine is not tolerated, hyoscine ($\frac{1}{2}$ per cent. hydrobromide) may be used—its effect is not quite so powerful and it less frequently causes local irritation. At the same time its general toxic effects are more frequently seen specially in elderly patients who may show mental symptoms on a small dosage. Eumydrin and duboisine are drugs occasionally employed when neither atropine or hyoscine can be tolerated. Homatropine has a good mydriatic effect, but as a cycloplegic is not so powerful as atropine. It is seldom used for any length of time in treatment, but as its action can be overcome by miotics, it is sometimes used temporarily. For refraction work in adults, however, it is the routine drug in use. Occasionally systemic reaction is seen, more commonly local intolerance. The most real risk is in the production of an attack of acute glaucoma—as with atropine. For the greatest safety a miotic should always be used to patients over twenty-five—certainly over forty—who have had homatropine instilled for any temporary purpose. This often produces a severe headache, but it is worth suffering this to avoid any risk of an attack of acute glaucoma, although it must be admitted that in a young adult the risk is exceedingly small.

Cocaine, by stimulation of the sympathetic fibres, and not paresis of the third nerve, effects some dilatation of the pupil, and may be used for obtaining a better view of the interior of an eye than may be possible with a small pupil. It is commonly used (2 per cent. hydrochloride) with homatropine to hasten and aid the effects, and the most powerful action in pupil dilatation to break down iris adhesions can be obtained by the subconjunctival injection of a combination of atropine, cocaine and adrenaline.

Eserine (sulphate or salicylate) up to 1 per cent., or pilocarpine nitrate up to 1 per cent., are the miotics in common use either for counteracting the effects of a mydriatic or in the treatment of raised intra-ocular tension. In addition to the miosis, spasm of the ciliary muscle is induced, and this readily gives rise to local discomfort and headache. In chronic

glaucoma when operation is not advised, either of the drugs, or a mixture, is prescribed, and the value of usage is enhanced by massage of the eyeball after application. For acute glaucoma 1 per cent. eserine in oily solution may be repeatedly used for some hours combined with local heat, but a general toxic effect especially in the way of increased vomiting in an elderly patient must be watched for. Cases of raised intra-ocular tension due to inflammation within the eye may be treated by mydriatics or miotics, but each case must be judged under the existing conditions, and judgment is often very difficult.

Eserine, if used for some time, produces a troublesome conjunctival irritation, and should be replaced by pilocarpine, which is much less irritant though probably of less value as a miotic.

Dionin (æthylmorphine) is a powerful vasodilator, and produces marked chemosis of the conjunctiva. It is not as freely used in this country as in many others where it is combined with atropine in inflammatory conditions, or used—up to 5 per cent. in strength—for promoting the clearance of corneal scars. For this latter requirement the yellow oxide of mercury ointment is more commonly used in this country.

For vasoconstriction adrenaline (1 in 1,000 solution) is sometimes used. Its effect is striking when a single drop is applied to an eye red from the recent presence of a foreign body, but no prolonged effect is obtainable, and repetition is undesirable. A few minims are put into some astringent lotions for the eye, but in such low dosage its effect is probably limited.

DRUGS USED FOR GENERAL EFFECT

Many drugs are given for the general good of a patient with an eye lesion. Strychnine, iron, arsenic, and vitamins A and D are valuable aids to local treatment in conditions due to debility, often after illness—e.g. corneal ulceration following influenza, or in phlyctenular ophthalmia. Salicylates are used in painful or inflamed conditions, especially of the sclerotic. Potassium iodide is used specifically in syphilitic conditions, in vascular lesions, or to try to clear opacities in the vitreous. Calcium is used in controlling progressive myopia, and also in

intra-ocular hæmorrhage. Little value may be placed on some of these drugs, but at least they appear to exert no harmful effects. More specific are the drugs used in syphilitic ocular lesions, such as arsenical preparations, bismuth, mercury and iodides. In some lesions, e.g. interstitial keratitis, the value of arsenical treatment is questioned, but at least no harm is likely to arise, and certainly this manifestation of congenital syphilis is of a much less severe type than formerly when energetic arsenical treatment was not employed.

The value of tuberculin treatment is very differently assessed by different ophthalmologists. This is partly, perhaps largely, due to differing views on the etiology of many ocular inflammations, particularly of the uveal tract. Frank and proven tuberculous lesions of the eye are rare, and there is little evidence to support the view that many cases of iridocyclitis or choroiditis are tuberculous if no other causative factor can be demonstrated. Tuberculin is nevertheless employed in many of these inflammations on the basis of a small dosage of non-specific protein rather than as a specific. Abstruse cases of intra-ocular hæmorrhage are treated on the same lines and, if care is taken to avoid general reaction by overdosage, it appears that local good rather than any harm results. Cases of frank ocular tuberculosis probably respond better to suitable general treatment—vitamins, a visit to Margate or Switzerland—than to a course of tuberculin.

Definite non-specific protein therapy is probably less used in this country than in many others, but intramuscular milk injections are often of great value in the treatment of a severe ocular inflammation either conjunctival or deeper. If suitable technique is used, no abuse should arise from such treatment, and the dosage can be controlled by judging the effect of the first injection. In adults 8 to 10 c.cm. is the usual dosage. Organotherapy plays a small part in ocular treatment, but parathyroid gland treatment is used with calcium therapy in the effort to limit the progressive myopia which assumes alarming proportions in some children. Autogenous vaccines are of value in recurrent infections of the eyelash roots and marginal blepharitis, but there is little evidence that vaccines

are of much value in other ocular conditions with the exception perhaps of gonococcal vaccine in iritis due to a past gonorrhoeal infection. Anti-tetanus serum may be used for a wound around the eye as it would be elsewhere in the body.

LOCAL ANÆSTHESIA

Drugs used for local anæsthesia play so large a part in eye work that they must be considered. Cocaine (hydrochloride 2 to 4 per cent.) is still the most generally used for instillation, although many substitutes have been produced and tried. Cocaine gives excellent anæsthesia, but has some disadvantages, viz. drying of the corneal epithelium which may be shed, and infection follow; dilatation of the pupil when not wanted; raising intra-ocular tension. Most substitutes aim at eliminating one or all of these drawbacks, but no one is yet perfect. For allaying pain in superficial or deeper operations, local anæsthetics are excellent, but in giving any length of freedom from pain in ocular inflammation, their value is disappointing. A drop of weak cocaine (2 per cent.) solution will make an otherwise painful examination a much easier and more valuable procedure, although the initial smarting of the cocaine must just be explained. After cocaine has been used, the eye should be bandaged for two to three hours for the safety of the corneal epithelium. Cocaine solutions must be fresh if they are to possess anæsthetic properties, and must be sterilized with care for the same reason. In painful inflammations cocaine is added to atropine in some cases, but the prescription of cocaine and its use for any chronic condition must be governed by the same precautions and care in ocular usage as elsewhere in the body. Novocaine is used (2 to 4 per cent.) for injection for operations on the eyelids, for block of the seventh nerve to prevent lid spasm in ophthalmic operations, and as a retro-ocular injection for intra-ocular operations or excision of the eyeball.

No special mention of general anæsthetics is required except to record the praise that evipan has received as a short anæsthetic for operations on the eye too painful to be conducted under local anæsthesia.

THE USE AND ABUSE OF DRUGS IN DISEASES OF THE EAR, NOSE AND THROAT

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IN the foreword to the last edition of the *Pharmacopœia* of the Golden Square Throat, Nose and Ear Hospital the editors state:—"The progress of pharmacology during the last twenty years . . has not had any striking effect on the therapeutics of laryngology though some departments of medicine have been revolutionized." This statement is also true with regard to rhinology and otology.

If new growths are eliminated, and for them pharmacology is rarely called into action, the majority of the diseases of the nose, throat and ear may be included in two groups. In the first group the conditions are caused by a narrowing of the lumen of some channel such as the glottis, the nose, the Eustachian tube or the opening of some sinus of the nose. In the second group the condition is that of acute or chronic inflammation of the mucous membrane lining the various channels and spaces constituting these three organs. The conditions in either of these groups, will in many cases, give rise to conditions in the other group. An obstructed Eustachian tube will give rise to inflammation of the middle ear, or a suppurating sinus will give rise to swelling and obstruction of the nose. The treatment of many of these conditions must of necessity be surgical but, whether it be medical or surgical, it consists in removing obstruction and in reducing inflammation or often in both, as they are each part of the other.

†. The pharmacological treatment is in two parts. The first part, which should come first, consists in removing by the application of suitable media, the products of inflammation—mucus, pus, cholesteatomatous material and so on. The second part consists in the application of other substances which will reduce congestion, swelling, œdema and inflamma-

tion generally. The first part usually takes the form of lavage, syringing the ear, gargling the throat, douching the nose or washing out a cavity. The mechanical action of the liquid is primarily important but its action can be increased by the addition of certain substances. Mucus is the most usual product of inflammation and a solution of bicarbonate of sodium is the best solvent of mucus. Other substances may be added to this solution to increase this property, to stimulate the blood supply, to disinfect and so on. In calculating the strength of pharmacological substances to be used, it should be so arranged that the osmotic pressure of the fluid approximates to that of the blood. If this is not done variations in osmotic pressure will cause swelling or undue shrinkage of the mucous membrane. This is particularly important in the nose.

The second part, the application of various substances, is aimed at increasing the rate of flow through the membrane, the reduction of congestion, the absorption of oedema, and the freeing of pent up discharge from its containing spaces. If these principles be borne in mind, pharmacology becomes almost a problem in mechanics, and empiricism and magic need have no place.

THE EAR

One of the commonest conditions in the ear for which treatment is sought is the accumulation of *wax*. When the accumulation is recent and the wax soft, gentle syringing will usually remove it. The effect of the syringing, which is largely mechanical will be increased by the addition of some sodium bicarbonate, two teaspoonfuls to the half pint. When the wax is hard and impacted, it is advisable and often essential to soften the wax. For this purpose drops should be instilled into the meatus and allowed to remain for fifteen to twenty minutes. The most satisfactory drops are those containing thirty grains of sodium bicarbonate, one or two grains of carbolic acid, and half an ounce of glycerin to an ounce of water. These drops will readily liquefy the most inspissated mass of wax and will also soften and loosen the accumulations of epithelial debris which are sometimes met. As an alternative, liquid paraffin or olive oil have very considerable soften-

ing powers. Solutions of peroxide or hydrogen have very little, if any, effect on wax.

Of other conditions of the external ear, the various forms of *dermatitis* of the meatus and pinna are the commonest. The eczematous type responds well to a mixture of equal parts of ointments of zinc oxide and ammoniated mercury, which is applied after cleaning up the raw areas with boracic acid lotion. Yellow oxide of mercury ointment is a useful alternative. The hypertrophic type of external otitis is suitably treated with calamine ointment, and may be painted with dilute solutions of silver nitrate (5 per cent.). In these cases exposure to the air is preferable to any form of dressing.

Furunculosis in the acute stage is best treated by application of 30 to 50 per cent. spirit drops and dry heat, such as hot wool, a lint covered hot-water bottle or an electric pad. Wet fomentations tend to make the skin sodden and to favour spread of the furuncles. Recurring furunculosis may be treated by a course of injections of *Staphylococcus aureus* vaccine, giving 50, 100, 200, 400, 600, and 1,000 millions successively at half-weekly intervals. Collosal manganese may be used as an alternative injection.

In cases of *acute otitis media* and myringitis, the application of dry or moist heat to the ear and the instillation of warm drops of glycerin of carbolic acid into the meatus is advised. The glycerin of carbolic acid of the British Pharmacopœia is too concentrated and should be diluted with four to six volumes of glycerin, giving a concentration of 4 to 2½ per cent. carbolic acid. As the condition almost always follows inflammation and obstruction of the Eustachian tube, it is of great value to apply treatment to the nasopharynx in order to free that tube. Inhalations of compound tincture of benzoin, one ounce to a pint of hot water are the most valuable, and the addition of a few crystals of menthol may increase the effect. The menthol may also be usefully applied as an oily spray, twenty grains to the ounce of liquid paraffin, to the nose and nasopharynx. Hydrogen peroxide applied to an inflamed drumhead serves no useful purpose.

When the tympanic membrane has ruptured or has been

incised and there is a discharge, continuance of the drops of glycerin of carbolic acid is advisable during the most acute stage. When the discharge is thin and flowing freely these drops are sufficient, the meatus being mopped clear with cotton-wool before their application.

When the discharge is thick and tends to accumulate it may be broken up and dislodged by drops of ten volume peroxide of hydrogen. It may even be necessary to syringe out the ear in some cases, and this should be done in the gentlest possible fashion and a saturated solution of boracic acid is used. When the acute stages have passed, drops of rectified spirit should be substituted for the glycerin of carbolic acid drops, beginning with 30 per cent. and gradually increasing to 60 or 70 per cent. A powder of 1 per cent. iodine in boracic acid may be introduced into the depths of the meatus and has considerable powers in drying up a mucopurulent discharge.

The treatment of *chronic aural discharge*, consists in removing the products—the pus, with drops of peroxide of hydrogen, gentle syringing with boracic acid or sodium sulphate solution and finally instillation of antiseptic and stringent drops. Of these rectified spirit is the most useful and strengths of from 50 to 90 per cent. may be used. To these may be added zinc chloride, flavine, mercurochrome or various other antiseptics, but as a rule, if the discharge does not clear up under cleansing spirit drops, surgical intervention will be required.

It will be appreciated that drops and lotions applied in the meatus help to remove secretions, but little finds its way into the middle ear. Hence instillations of drops containing various antiseptics and bactericides will have no direct effect on the inflamed middle ear, and may only cause irritation and inflammation in the meatus. On the other hand too vigorous syringing may drive infected material into the mastoid antrum and precipitate mastoiditis.

Granulations may be touched with trichloroacetic acid, chromic acid or silver nitrate.

It is difficult to produce *local anæsthesia* of the tympanic membrane, but a non-inflamed membrane may be anæsthetized by 10 to 15 per cent. solution of cocaine in aniline oil.

This must always be made freshly as the aniline does not keep. An inflamed tympanic membrane is not anæsthetized by this solution but requires the application of Bonain's drops which consist of a mixture of equal parts of cocaine, menthol and carbolic acid. A few drops of this liquid applied to the membrane will produce a considerable degree of anæsthesia in some eight to ten minutes. If left in contact too long they may cause necrosis.

After a cortical *mastoid operation* the meatus and tympanic membrane are cleaned out daily with hydrogen peroxide, followed by spirit drops. The mastoid cavity if left open is best packed with ribbon gauze impregnated with a mixture of bismuth-iodoform-paraffin paste (B.I.P.P.) and liquid paraffin in equal parts. This dressing keeps the wound clean and sweet and almost abolishes the discomfort of mastoid dressings. When a mastoid cavity is purulent and foetid, the gauze packing may be soaked in eusol solution, and a Carrel-Dakin apparatus brought into use. At a later stage the gauze may be soaked in flavine, impregnated with iodoform, or when healing is slow with lotio rubra (zinc sulphate). Finally dry gauze may be used. The cavity of a radical mastoid operation is packed in the same way with B.I.P.P. and later with the dry iodoform gauze. Granulations may be touched with silver nitrate solution or with trichloroacetic acid.

Tinnitus aurium may be treated with a mixture of dilute hydrobromic acid, with potassium bromide or quinine. Luminal is sometimes of help and may be usefully alternated with the previous mixture, week and week about.

Intratympanic injections of thyroxine and other substances have been suggested for the treatment of *otosclerosis*, but experience has shown that the effect of this is minimal or negligible.

THE NOSE

The pharmacological treatment of the nose and nasopharynx is largely aimed at the reduction of inflammatory processes. These may be catarrhal or suppurative, depending on the type of infection and whether the secretions are mucoid or muco-purulent. Treatment is applied in the form of inhalations, douches, sprays and local applications (of oils or ointments).

The *douche* or *collunarium* is usually an alkaline watery solu-

tion of suitable osmotic pressure, the function of which is to wash away the secretions formed in the nasal passages and to reduce swelling of the mucosa. Such douches should be warm and the suitable temperature is attained either by dissolving powder in warm water or by mixing a more concentrated solution with warm water. The lotion should be sniffed up the nose from the hand, a saucer or an egg-cup. No form of syringe, either of the piston type or rubber-ball type should be used, nor should the lotion flow from any form of douche can or syphon apparatus. In these types of apparatus the pressure is greater than is consistent with safety and infected material may be forced into the Eustachian tube or accessory sinuses. The small glass nasal tube or boat is safe as the pressure can be, at most, only two or three inches of water. This is a convenient method for those patients who find the sniffing method difficult.

The lotions used for these douches contain one or more of the following :—sodium bicarbonate, sodium baborate, and sodium chloride. A very convenient mixture is that of the three in equal parts—a teaspoonful of the resulting powder being dissolved in a teacupful of warm water. This is a particularly convenient mixture as it may be kept in powder form. As a solution it may be mixed with sodium salicylate, or in the more purulent form of rhinitis with small amounts of carbolic acid. The use of the latter, the strength of which should not be more than 1 in 1,000, should not be persisted in for more than a few weeks at a time or it may damage the nasal mucosa. For the spasmodic form of rhinorrhœa a douche made up of hazeline lotion is useful. In septic and ulcerative conditions of the nose dilute solutions of potassium permanganate or of sanitas are prescribed. Nasal douches should not be used for too long periods or a hypertrophic condition of the mucosa will be set up with intractable catarrh.

Sprays for the nose may vary greatly in composition. The substances most usually employed are menthol, eucalyptus, thymol, chloretone and nitrate of mercury. The four volatile substances are used for their stimulating action and are usually prescribed in solution in liquid paraffin, with a total content of about 20 grains to the ounce, whether they are used singly or

in combination. The nitrate of mercury is used as oily antiseptic spray and in about the same strength. A watery spray containing 2 grains of sulphate of atropine and 120 minims of 1 in 1,000 adrenaline hydrochloride to the ounce of water is used for vasomotor rhinitis in which such a spray is required in addition to allergic therapy.

Inhalation may be administered by steaming or in dry form. The former has been discussed under the treatment of acute otitis and when applied for nasal conditions are used in the same manner. Friar's balsam (tinct. benzoin. co.) is a useful formula, but menthol, eucalyptus, thymol and pine may also be used and are mixed with light magnesium carbonate and water and then added to the hot water. Dry inhalations consist of volatile substances, either in pure form or applied on the sponge of a Burney-Yeo respirator. The substances used in this form of medication are camphor, menthol, cinnamon, eucalyptus, creosote and Scotch pine. Eighty to one hundred minims of any of these in 1 ounce of rectified spirit is a satisfactory proportion. These dry inhalations are useful in congested and inflamed conditions of the mucosa, but when there is a profuse secretion the steam inhalations are more valuable.

Local anæsthesia can be produced in the nose by application of cocaine solution mixed with adrenaline, or with the various substitutes, such as tutocaine and pantocaine. Of these various substances cocaine gives much the best results and the risks of cocaine poisoning are reduced to a minimum if the cocaine, usually in 10 per cent. solution is mixed with one-fifth part of 1 in 1,000 adrenaline solution, and care is taken that none of the solution reaches the stomach. A useful and safe solution of cocaine is one containing $3\frac{1}{2}$ per cent. cocaine, 1 in 1,000 adrenaline solution, 2 per cent. potassium sulphate. The potassium sulphate solution acts as a catalytic agent and the anæsthesia to be expected from a 15 per cent. solution of cocaine is attained. Cocaine can also be applied in the form of a paste or an ointment.

THE THROAT

The treatment of the pharynx exemplifies the principle of washing away secretion and application of stimulating and antiseptic substances. The lotion takes the form of the *gargle*

and, as in the nose, bicarbonate of sodium and sodium chloride are very useful bases. To these may be added potassium chlorate, alum, thymol, chloretone and sanitas. A useful and stimulating gargle consists of potassium chlorate, 12 grains, sodium bicarbonate, 6 grains, and potassium bicarbonate 6 grains to an ounce of water—mixed with equal parts of warm water. In septic conditions of the throat—quinsy, ulcerative sore throat, severe follicular tonsillitis—solutions of potassium permanganate, perchloride of iron, perchloride of mercury and hydrogen peroxide are valuable as deodorants and cleansing agents. In fulminating and sloughing pharyngitis, now rarely seen, a gargle which must be freshly prepared, consisting of strong hydrochloric acid 5 minims, and potassium chlorate 9 grains to 1 ounce of water. The fluid contains free chlorine and is valuable in this severe type of ulceration of the pharynx.

After the use of the gargle a *paint* is often applied. For small peptic ulcers the mel boracis of the pharmacopœia is useful. For follicular tonsillitis the B.P. glycerin of tannic acid or of alum has a most satisfactory action and causes the ejection of secretion from the follicles. For acute and subacute pharyngitis and for tonsillitis other than follicular, Mandl's paint, which consists of iodine 5 grains, potassium iodide 6 grains, ol. menth. pip. 1 to 4 minims, to 1 ounce of glycerin, is the ideal paint.

Sprays for the pharynx and larynx are usually aqueous and may contain alum, perchloride of iron or permanganate of potassium, each about 5 grains to the ounce. The oily compound chloretone spray containing chloretone, menthol, camphor, cinnamon and oil of pine 3 to 5 minims of each in 1 ounce of liquid paraffin is useful in acute pharyngitis or laryngitis.

Of *pastilles* and *lozenges* there are many brands, containing almost every drug in the pharmacopœia. Most patients have their own particular choice and the majority have some effect in reducing the discomfort of inflammation of the throat. Those usually prescribed are those containing benzoic acid, tannic acid, borax, formalin, krameria, menthol and potassium chlorate. Their function is mainly to allay discomfort and

reduce congestion, but they will usually relieve a temporary hoarseness from slight laryngitis or overuse of the voice. For the ordinary inflammatory conditions of the larynx the methods of treatment advised for the pharynx are applicable. In addition to these inhalations of tinct. benzoin. co. are often employed and ol. pini. sylvestris may also be used. The sprays are specially useful, that of chloretone being productive of much comfort to the patient.

For *tuberculosis* of the larynx there are certain special forms of treatment. For the extreme pain of tuberculous ulcers in the larynx and also in the pharynx, the insufflation of a powder of equal parts of anæsthesin and orthoform is particularly valuable. About 40 grains of the powder is drawn up a glass tube by a sudden inspiration. For the pharynx a straight tube is sufficient but for the larynx Leduc's tube with a short downward bend at the pharyngeal end is used. With this tube the powder always enters the larynx. The powder should be insufflated about fifteen minutes before food, as that time elapses before the analgesic action has reached its maximum. In some patients this powder excites attacks of coughing. In such cases an emulsion of anæsthesin may be substituted. A teaspoonful of this emulsion is placed on the back of the tongue and held there as long as possible. It will gradually slip down into the hypopharynx without swallowing movements and will produce a degree of analgesia comparable to that of the powder. Various substances, such as guaiacol, lactic acid, menthol and chaulmoogra oil, have been injected into the tuberculous larynx, but have little, if any, effect.

Local anæsthesia of the pharynx or larynx may readily be induced by the application of cocaine and adrenaline on cotton-wool applicators. For the pharynx 10 per cent. solution of cocaine with one-fifth part of adrenaline solution can be used. For the larynx 20 per cent. with one-fourth part of adrenaline is used. The addition of adrenaline reduces the risk of toxicity and as in the nose avoidance of swallowing the cocaine still further reduces the risk. One per cent. novocaine may be injected into the submucous area for small operations on the throat.

GENERAL PRACTICE

X—PRESCRIBING AND DISPENSING

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PRESCRIBING

PRACTITIONERS who were taught medicine by physicians of the old school sometimes deplore their own ignorance of materia medica, when they think back on their teachers' long and varied prescriptions. But they need not lament, for this knowledge was no more a part of their skill in healing than the frock-coat and top-hat in which they made their rounds. The practitioner who wishes to test the value of his own knowledge of drugs should ask himself a few questions about a small list of drugs, say opium, atropine, adrenaline, half a dozen common narcotics, a few purgatives, the salicylates, digitalis, amyl nitrite, some mercurial and arsenical preparations—there is no need to make the list complete. The questions he should ask himself are: What is the effect of the drug on man? How does this effect benefit the patient in disease? What are the signs of an overdose? How long after administration (oral or hypodermic) does the effect appear? How long does it continue? What is the average dose required to produce the effect? Are wide individual variations in susceptibility found in man? If so, what is the largest safe dose to start with? When he has answered these questions, he can ask himself one more question: Is there ever anything gained by combining it with another drug? In most cases the answer to the last question is, no. So the prescribing of powerful and active remedies is largely a matter of knowing the dose and choosing the route of administration. If the drug is going to benefit the patient there is no need to combine it with a number of inactive ingredients, though occasionally, for example in prescribing a soothing cough bottle, the choice of the flavouring medium is important.

In the section of this article which deals with prescribing it is only possible to touch on a few of the valuable drugs. With

reference to those omitted as well as those included, the young practitioner is urged, once he has decided that a certain drug is really useful, to find out all he can about it both from reading and experience. To take an example, every practitioner has adrenaline in his bag and uses it often. But does every doctor know the following points? That absorption is usually much more thorough if the injection is made into a muscle instead of into the subcutaneous tissue. That a solution which is yellow or red is relatively inactive, but not absolutely inactive. That adrenaline is dangerous in patients who suffer from "angina of effort." How many have ever taken the trouble to measure the rise in blood pressure that follows an injection of adrenaline and the duration of that rise?

There can be no sillier notion than that the general practitioner cannot for himself determine the action or efficacy of drugs. True, he cannot usually determine if one sample of, say, neoarsphenamine or liver extract is better than another, for he has not the material. But he can determine if a particular drug does that which it is reputed to do, and unless he is very lucky, he can at some time or other study the effects of an overdose. From the moment he starts practice the young practitioner should determine to study the effects of single drugs, believing nothing that he cannot himself prove. He will soon be in the happy position of a man who knows his own strength, and, when this or that new drug is put on the market, he will be far better able to assess its value than his uncritical colleague.

To prescribe effectively it is necessary to distinguish between the effective drugs, that is those which exercise a definite and useful effect, and the large number which (like the bitters in a tonic) are given only to affect the senses or (like potassium iodide) because the prescriber hopes they may do some good. The reason why this distinction should be kept in mind is that the practitioner who makes a habit of always prescribing his medicines as a bottle to be taken three times a day, as tonics and rheumatism mixtures are prescribed, will fail to get the best possible results when he is handling powerful and active drugs, such as morphine and digitalis.

For in general it may be said that the highly active drugs produce their action within a short time of their absorption into the circulation, that this action can be clearly recognized, that the dose of the drug required to produce it varies much in different individuals, that a little more will endanger the patient's life, and that the dangerous dose varies much in different individuals. So the administration of a drug of known efficacy follows simple rules. The prescriber should make certain that the drug will be absorbed, and in case of doubt about this should give it by injection; he should give a dose which will certainly not be dangerous (even in hypersensitive patients), should observe the effect produced by this dose within a short time, and if the required effect has not been produced he should give more at once. It is almost impossible to follow these rules unless the drug is given by itself; if several powerful drugs are given at the same time it is difficult to avoid the two extremes of too much and too little.

Opium and its alkaloids.—In man there is as a rule little difference between the effect of morphine and opium, but in some subjects opium may be found to be less nauseating. Omnopon or pantopon may be used as a "hypodermic opium," but it should be remembered that, whereas opium contains 10 per cent. morphine, omnopon or pantopon contains 50 per cent. The danger of morphine is the same danger as that which accompanies the use of all narcotic drugs, namely that a dose very little larger than that which produces unconsciousness makes the respiratory centres insensitive, and the breathing may become so shallow that the patient may die from anoxæmia. When a patient is exhausted by a prolonged illness, particularly an illness of the heart or lungs, this dangerous effect on the respiratory centres can be produced by much smaller overdoses than in health, and hence the following rule should be followed with particular care in such cases: If there is reason to fear that morphine (or any other narcotic drug) is likely to produce a grave degree of respiratory depression, do not necessarily withhold the drug altogether, but give it in small doses, and see the patient in from half an hour to an hour after each dose. The physician who follows

this rule will be able to stay his hand in time before doing harm, and he will be able occasionally to use morphine in cases in which a "single-shot" method would not be safe; he will often find that the dose necessary to ease pain or produce sleep will be a great deal smaller than he expects.

Morphine (and of course opium too) often produces persistent vomiting. Codeine is much less inclined to do this, and has the further advantage that it almost never gives rise to addiction. Codeine can be used instead of morphine in nearly every case except when the aim of treatment is to relieve pain, for codeine has little pain-relieving property; it is especially useful in chronic diarrhœa, and should be used a good deal more than it is. The effective dose is from two to four times as much as that of morphine; that is to say, in a case in which $\frac{1}{4}$ grain morphine would be effective, from $\frac{1}{2}$ to 1 grain codeine should be given to produce the same effect.

In hæmorrhage from the lungs or the stomach morphine or opium is commonly given by experienced practitioners, in spite of the many theoretical objections. Unless there is pain to be eased, codeine in an appropriate dose, is preferable to morphine for the purpose of producing rest in internal hæmorrhage.

The barbiturates are the hypnotics in most general use, and in the majority of cases are the most satisfactory. Four have a prolonged action; barbitone (veronal) and its soluble sodium salt, soluble barbitone (medinal), dose of each 5 to 10 grains; phenobarbitone (luminal or gardenal) and its soluble sodium salt, soluble phenobarbitone dose of each $\frac{1}{2}$ to 2 grains. The action of dial, dose $\frac{1}{2}$ to 3 grains, is also delayed, though not quite so long. All these five barbiturates if given at night-time usually leave the patient feeling sleepy for the greater part of the following day. Possibly in the near future some of the other barbiturates, which have a shorter period of action, may become more generally popular, for example evipan. But it is wise for the general practitioner to be cautious about the use of drugs, especially narcotic drugs, until they have come into general use.

When it is desired to give a drug which will with one dose

induce a somnolent state, soluble barbitone (medinal) is recommended. It can be easily carried in $7\frac{1}{2}$ grain tablets, and the tablets can be dissolved in water, thus forming a "draught." It is well to note the danger of placing in the patient's hands a supply of tablets. Many people are incredibly careless about taking tablets, especially when the brain is a little bit fuddled by sickness, and it is likely that a small percentage of apparent attempted suicides by means of veronal or medinal are in reality cases of accidental overdosage. A further advantage of instructing the patient's attendants to administer his hypnotic already dissolved, instead of as a tablet, is that, in cases in which the drug has to be repeated for several nights, it is easy without the patient's knowledge to reduce the dose.

It is often better when a patient is sleepless and nervous not to give the hypnotic in the guise of a "sleeping medicine" just before bed-time, but to prescribe the same or a similar drug in small doses through the day as a "sedative." A mixture containing from $\frac{1}{4}$ to $\frac{1}{2}$ grain sodium luminal to the dose will usually within a day or two restore sleep to such patients with the advantage that the patient has not the demoralizing feeling that he is being "doped." It is worth while remembering that sodium luminal keeps well in solution, and that it is not incompatible with sodium or potassium bromide.

When the object of the narcotic is, not to produce a fairly normal depth of sleep, but to quiet a patient who is restless from, say, meningitis, an intramuscular injection of sodium luminal is very effective. Usually about 3 grains will be effective in an adult. Ampoules of sodium luminal solution ready for injection are a useful drug to carry in the practitioner's bag.

Caution about dosage of barbiturates is necessary whenever the prescriber meditates giving a single large dose of any member of this group. Remarkable instances of extreme susceptibility are occasionally met with, and if a dose of, for example, 3 grains of sodium luminal is contemplated, it is a wise precaution to give about 1 grain at first, and return in an hour to observe the effect, when, if necessary, a supplementary dose can be given. In one case a patient who was given

7½ grains of medinal slept for over 24 hours; in another case 15 grains of the same drug is recorded to have produced deep coma lasting for several days. Such occurrences are rare, the average dose necessary to kill an adult being about 60 grains.

Other narcotics.—In general the other narcotics differ wonderfully little in the effect which they produce on the brain. They do differ very considerably in the length of time for which this effect persists. Nor is any one of them in itself particularly inclined to give rise to an addiction; addiction can occur with any drug which numbs the senses. Of the narcotics with a short period of action only one is in common use. Paraldehyde given by the mouth is absorbed rapidly, acts without delay, and permits the return of consciousness within a few hours. Despite what has been written and copied from book to book, paraldehyde is not a suitable narcotic in pneumonia, for it often makes the patient delirious and restless. In pneumonia, when an hypnotic is required it is usually wise to add to the pure narcotic a safe dose of a pain-relieving drug, that is to say morphine.

Chloral has probably been both praised too highly and blamed too much. It does not appear to be either safer or more dangerous than, say, medinal or barbitone.

Sulphonal, trional, and tetronal are now little used. They are but slowly absorbed, and so the onset of sleep is delayed and uncertain; their effect is prolonged, and in the opinion of many authorities, with which the author agrees, have no advantages to commend their use.

Hyoscine (scopolamine) should not be used by anyone who is not familiar with its effects. It will often produce a very satisfactory degree of narcosis in a restless patient, but at other times it will be followed by a restless delirious state instead of sleep.

The bromides (it does not matter which salt is used) are well-known to exert as a rule only a feebly narcotic action; it is practically impossible to give a fatal dose. Occasionally, especially in the very young, this feeble action is adequate to produce sleep. At any age, but especially in old age, the long continued ingestion of bromides may produce marked mental

dulness and even dementia. When prolonged administration of a narcotic is desirable, as for example in epilepsy, a barbiturate such as luminal is preferable to a bromide salt, for if a patient should become mentally unstable as a result of saturation with bromides, recovery may not occur till many weeks have elapsed, for bromides are very slowly eliminated. Barbiturates on the other hand do not remain for more than a few days in the tissues after their administration has been stopped.

Digitalis.—Modern research has added much knowledge of how digitalis works, but it has not supplanted the rules of Withering, which may be paraphrased as follows:—give digitalis till the looked-for effect is produced, and if the drug has succeeded in slowing the pulse to about 70 do not press it any further. The chief benefit conferred on the practising physician by modern research is that accurate standardization of digitalis preparations has enabled him to give moderately large initial doses with safety. In any patient with dropsy and the very fast grossly irregular pulse of auricular fibrillation it is safe to start with a dose of 3 c.cm. (45 minims) of the tincture, provided that the patient has not been taking digitalis recently. It simplifies things to remember the dosage of tincture of digitalis in cubic centimetres, because 1 c.cm. of the tincture is equivalent to 0.1 gramme of the powder. Such a dose usually produces some recognizable improvement, but usually not enough. Six hours should be allowed to elapse between one dose of digitalis and the next, for it takes about this time for absorption to be completed and the full effects of the dose to be produced. The dose should be repeated every six hours, the dose being large or small (from 3 c.cm. to 1 c.cm.) according to the drop in the heart-rate. In patients of large build it is safe to start with a dose of 6 c.cm. Of course the counting of the heart-rate should be done with the stethoscope on the chest-wall, not by the finger on the wrist. The ideal method of administering digitalis is to provide the patient with the undiluted tincture or tablets of the powdered preparation, for if the tincture is made up into a mixture with water it begins to decompose and to lose its efficacy in about twenty-four

hours. But with stupid or careless patients who have to take digitalis continually over a long period it is in practice perfectly satisfactory to provide them with a "Mist." containing, say, 15 minims of the tincture in half an ounce of water; such a stock "Mist." would be of little use in an emergency when a powerful effect is desired, but in prescribing it to a "chronic heart," the physician can feel he is adopting a precaution against overdosage, as by the time the end of the bottle is reached the strength of the preparation will have fallen off considerably. But of course the mixture should never be repeated without a visit by the doctor to check the heart-rate. Digitalis poisoning is no mere bogey; it is a real danger for the patient who is taking the drug regularly. Remember that digitalis is a poison to the heart, a useful poison it is true, but a poison none the less, and must be used with discretion.

In the tachycardia of fevers it is widely, but not quite unanimously, agreed that digitalis is more likely to do harm than good. In all cardiac conditions other than the familiar congestive heart-failure with auricular fibrillation and œdema the young physician would be wise not to use the drug without special investigation of the case. The correct treatment of the cardiac arrhythmias is often a difficult problem even for the most experienced.

The hypodermic injection of small doses of digitalis preparation in the pious hope of combating collapse or surgical shock is well recognized to be futile. Fortunately the dose commonly given is so small that no harm is done.

In grave emergencies when the physician sees a case of heart failure of the congestive type already almost *in extremis* the administration of digitalis by mouth may be too slow a method of slowing the ventricular rate. In such a case the glucoside *digoxin* may be injected intravenously in doses of 1 milligramme, and the dose repeated in two hours; rapid digitalization may thus be attained. But such cases are fortunately very rare, as cardiac failure of this type is commonly insidious. When such a case is encountered remember that more than digitalis may be required, for extreme cardiac failure with distension of the right auricle is one of the few

conditions in which blood-letting may be life-saving, and administration of oxygen is usually needed too. Lauder Brunton's observation that in one such case the blood would not flow from the vein until oxygen was administered is probably familiar to many readers. In these urgent cases a previous generation used strophanthin, but the drug has no advantages and has certain disadvantages.

Emergency restoratives.—A few words on theory will simplify discussion of this class of drugs. It is widely recognized that the failure of the heart's action which is recognized as the sign of approaching death is commonly the result of insufficient oxygenation of the blood, and that this insufficient oxygenation follows the shallow breathing produced by an inactive respiratory centre. When a patient is dying from, say, an overdose of a narcotic or from toxæmia of pneumonia, his brain dies before his heart; he dies from "brain-failure" (failure to control the movements of respiration) and, if respiration can be maintained, the heart will continue to beat strongly for much longer than it would if the breathing were allowed to fade away. So the rational treatment for the patient who has a rapid thin pulse and shallow respirations is to get oxygen into the blood-stream at once. The heart needs oxygen, not stimulation. This is just as well, because it is doubtful if there is an effective heart-stimulant other than adrenaline, which is often a dangerous drug. Most of the reputed "emergency restoratives" are not heart stimulants at all, but stimulants to respiration; by that is meant that in the experimental animal the rate and depth of respiration increase when they are injected.

In practice of course the important question is, setting theory aside, do any of the "emergency restoratives," "analeptics" (or "resurrection drugs") as they are sometimes called, ever perform the expected miracle? If so, which of them? There are eminent authorities who support the claims of one, others who champion others. Such a disagreement of experts is in itself significant, and leaves the young practitioner without any appeal to "authority" open to him; he must form his own opinion as to the usefulness (or uselessness) of any or all. One

thing must be remembered, that the heart muscle inadequately supplied with well oxygenated blood will die; oxygen in the lungs is essential, and a combination of artificial respiration and carbon dioxide inhalation is probably the best method of persuading the collapsed patient to transfer the needed oxygen from the atmospheric air to his own lung alveoli.

"Stomach bottles."—Assuming that when the practitioner suspects the existence of organic disease he insists that the patient shall have full investigation of his symptom carried out, what should be prescribed for the minor maladies of digestion? When should an alkaline mixture be given, and when an acid? In all doubtful cases the simple advice is applicable—"try and see." A trial in this case does no harm. Study of the practice of a physician who has a reputation for "treating stomachs" will, however, reveal the illuminating fact that his reputation depends less upon the ingredients in his mixtures than on the accompanying opinion or advice. For example the advice to eat "small and often," or to recline for an hour after a meal may be the factor to which the patient owes his relief from indigestion, though the mixture may get the credit. When a mild indigestion is exaggerated by a phobia of cancer, the physician who is able to accompany his prescription by a well-grounded and definite assurance that all is well will cure the case that for months baffled the man who made only a superficial examination and "hem'ed and haw'ed." One piece of specific advice: a great many patients tell the doctor that they have a pain which is relieved by food, or relieved by bread-soda. If in such a case the doctor fails to do more than give partial relief with an alkaline mixture, he will probably get much better results if he insists on small frequent meals, and do better still if he starts off by putting the patient to bed. In many cases the nature of the food taken is less important than the quantity taken at a time; if the particular foodstuff taken does not suit the patient, his stomach will tell him so; in fact most patients know the food they can eat and the food they cannot before they reach the stage of consulting their doctor.

As to which of the alkaline mixtures should be used, in my

opinion it does not matter very much; anyhow it is easy to try a change at any time and observe the effect on the patient's symptoms.

Drugs in disease of the urinary tract.—The first thing to remember is that to make a habit of prescribing a bottle for undiagnosed frequency of micturition is a sure and certain way to lose reputation. As a rule there is an organic cause for this symptom, and as a rule this symptom cannot be relieved by drugs alone. The patient will soon find this out and go to someone else, only to learn (no matter how much the other practitioner may try to cover up his colleague's mistake) that there was "something there," which could have been discovered earlier if an examination had been made.

Of the real value and correct use of "urinary sedatives" and "urinary antiseptics" in infections and inflammations of the urinary tract there is little to be said, for the subject is one on which the majority of men find it hard to make up their minds. It may be some consolation for the young and inexperienced to be told that their uncertainty is shared by their more experienced colleagues and those in high places. Much the same may be said about the various drugs recommended for the treatment of Bright's disease.

Two small points are worth mentioning. One is that hexamine must not be given in too large doses, or discomfort and irritability will be produced within a few hours. The other refers to the use of belladonna alkaloids for frequency of micturition; the simplest way to find out if atropine has any effect in relieving this symptom in any given case is, not to give small repeated doses in a bottle, but to give a single large hypodermic test-dose. So too in whooping-cough the effect of atropine can be tested by giving the child an injection of 1/100 grain at bed-time and observing if the paroxysms are less frequent during the night; atropine is occasionally useful in whooping-cough, possibly through its action in drying the respiratory passages, and thus making it less likely that a little secretion will be present to excite a paroxysm when the child lets its head fall back as it tries to go to sleep.

This reference to anti-spasmodic drugs would be incomplete

without mentioning the discomfort sometimes produced by ephedrine, especially in the elderly male asthmatic who should be warned that an overdose of ephedrine tablets may easily produce irritability and even retention of urine.

DISPENSING

This section is not addressed to practitioners experienced and learned in pharmacy and the art of compounding, but it may fairly be presumed that in these days few newly-qualified medical men have more than a nodding acquaintance with the mysteries of the pharmacy. The physician who is an experienced dispensing chemist can undoubtedly prescribe with effect and safety a large number of flavouring and colouring matters, and can venture on novel mixtures of reagents in his tonics without fear of incompatibility. But all others, among whom I count myself, should follow the wise rule of always prescribing potentially dangerous drugs by themselves, and ringing the changes on a familiar list of stock prescriptions for the tonics and other placebos. A word of caution for those who themselves dispense their own prescriptions; banish from your shelves all potential poisons which are not necessary. With the discovery of the effect of liver on pernicious anæmia the last excuse for the use of arsenious oxide in medicine has disappeared. The plaster or liniment containing belladonna or atropine is just as effective with this drug left out. Even dilute prussic acid may occasionally do harm in the wrong place; it never does good. Strychnine injected may possibly be of value in emergencies, and may, if approved of for this purpose, be carried in the hypodermic case; but is the presence of this poison in the tonic or purgative pill sufficiently important to justify the risk of accidents? Accidents with strychnine are far more common than is realized; children have died in strychnine convulsions from swallowing a number of sugar-coated "dinner-pills," and stock-bottles with strychnine in them have been dispensed undiluted, though intended to be diluted with several parts of water. It must not be forgotten that mistakes which seem impossible can be made when tired and over-worked (the very time that the demand for "bottles" is heaviest), that a night-call will occasionally send the prac-

tioner to the medicine cupboard in a state of sleepy stupor, or that the labels which are so familiar to a regular dispenser may be misunderstood by a strange assistant.

Above all things useful household chemicals, such as lysol and methylated spirits, must have their proper place in a cupboard quite distinct from that in which drugs for oral administration are kept. Black draught and lysol have been confused before now, even by those who should have known better, and there must be no opportunity given to the practitioner's own household to make such mistakes.

What should the stock-bottles be? First of all the practitioner should arrange for a number of every-day mixtures to be made up by a firm of chemists (he will probably find it easier and cheaper to do this than to make them up himself). These bottles should contain, palatably made up and suitably coloured, those prescriptions of his old hospital formulary or of other formularies, which he will want to use for the patient who just "wants a bottle," and in whose case no powerful or potentially dangerous drug is required. A few different "stimulant expectorants," a few alkaline mixtures, a few acid mixtures, a cooling draught, a large number of tonics (for it is not politic to give the mistress the same medicine as the maid, nor the child a watered-down version of the father's placebo). In addition there should be a few flavouring and colouring reagents, in order that the doctor may occasionally vary the taste or flavour of a stock-bottle; for example a bromide mixture may produce different psychological effects according to its colour, and one patient may resent an antacid mixture which looks like nothing more than chalk and water, though to another the same appearance may at once suggest the probability of relief from indigestion. These harmless stocks should be kept where they are easily got at and kept absolutely distinct from the poisonous alkaloids, glucosides and narcotics. If they are kept to themselves they need not even be locked up.

A few stock mixtures containing dangerous drugs must be kept; for example, a morphine mixture for coughs must be kept in bulk, for it has to be very frequently prescribed. So must a stock sleeping-draught. One or two such mixtures may safely

be given a place among the placebos, provided they are distinctively bottled and labelled.

But the locked poison cupboard should be treated with the greatest respect. It should be a cupboard that the practitioner himself has only rarely to open, to dispense a large dose of some powerful drug, or to replenish the stock of ampoules or tablets in his bag. This cupboard should be kept locked in practice as well as in theory. The number of drugs in it should be as small as possible, for the attempt to imitate the array of poison-bottles seen in a chemist's shop is likely to lead to confusion. In this connection the practitioner should make up his mind what to do about the numerous samples he receives. It is probably best to throw such packets away at once unless it is proposed to make use of them in the near future. Sample packets look at a glance very like each other, and the appearance of his shelves may suggest that there is still a packet of a favourite narcotic left for emergencies, whereas in reality the packet contains merely a calcium preparation. New drugs or drugs with unfamiliar names should as a rule be thrown away, for the general practitioner is rarely in the position of being able to experiment with safety, and the confusion between proprietary trade names may lead to ridiculous and even dangerous mistakes. It will not for a long time be forgotten against a friend of mine that he once recommended a colleague to prescribe "X" as "the newest and best hypnotic," whereas in fact it had just been introduced to the locality by an energetic agent as a safe aperient.

In conclusion it must be stated that the so-called "art" of prescribing is no art at all, at least in so far as potent remedies are concerned. Diagnosis comes first, then the decision that a certain drug is indicated; all that is left is to give the drug until the expected effect is produced. This is a matter of exact knowledge aided by repeated observations of the particular case.

So far as the prescribing of placebos is concerned there is certainly an "art" which may be acquired, but it does not consist in the knowledge or the using of many drugs. Experience alone and the knowledge of human nature can teach it.

PRACTICAL NOTES

DRUG TREATMENT OF CARDIAC DECOMPENSATION

UNDER the general title "The Pharmacopœia and The Physician" the *Journal of the American Medical Association* is planning a series of articles written by eminent clinicians concerning official medicines. Henry A. Christian of Boston contributes the article dealing with drugs in the treatment of cardiac decompensation (issue of January 2, 1937, cviii, 44). Such decompensation occurs as the result of rheumatic or syphilitic valvular disease, or as the result of myocardial insufficiency arising from coronary sclerosis, hypertension or thyrotoxicosis. The primary treatment consists in physical rest in bed in a half-sitting posture. While decompensation persists fluid intake must be restricted, and in the early stages the diet should be limited to $1\frac{1}{2}$ pints of milk daily administered in frequent small feeds. Since many cardiac patients have been prevented by their symptoms from getting sufficient sleep it is important to administer one-sixth to one-quarter of a grain of morphine for the first night or two. Digitalis is the drug of greatest value and no form of it is superior to the powdered leaf as pills or capsules. For patients with marked decompensation, not having received digitalis in any form within the past week, the initial dose should be $7\frac{1}{2}$ grains to be repeated in four hours and usually again four hours later, the patient thus receiving $22\frac{1}{2}$ grains in the first eight hour period. After this 3 grains or $1\frac{1}{2}$ grains should be given and continued until a therapeutic effect or some evidences of toxicity result. If œdema is marked, diuretics are indicated and salyrgan and novurit, not so far included in the Pharmacopœia, are the most effective. If a hydrothorax is present it should be removed by tapping. Practically all patients with cardiac decompensation, after it has been treated satisfactorily, need to continue to take digitalis indefinitely in amounts just short of causing toxic disturbance. For the majority of patients this is $1\frac{1}{2}$ grains of powdered leaf once or twice daily; few patients do better on either more or less than this as determined by trial.

VITAMINS IN DISORDERS OF THE SKIN

A GOOD summary of the value of the administration of big doses of vitamin concentrates in certain skin disorders is given by W. Müller (*Münchener medizinische Wochenschrift*, December 25, 1936, lxxxiii, 2116) with special reference to the treatment of exfoliative dermatitis in an old man. This patient received doses of vitamins A, C and D internally, and also a vitamin concentrate was rubbed into the skin in the form of an ointment. Müller points out that vitamin A ointment may also be of value in any condition of the skin in which epithelial

regeneration is desired. Vitamin C he considers should be more often utilized, and authorities have reported its value in psoriasis and in some forms of purpura. Vitamin D he thinks is of value in dermatology when it is required to raise the level of the blood calcium, as in certain forms of eczema and in urticaria. He suggests that vitamin D and calcium can be given together in such conditions. A vitamin H has been used in certain forms of seborrhœa, pyoderma and intertrigo, but this is not yet available commercially.

OBSTETRICAL ANALGESIA

V. G. DAMON (*American Journal of Obstetrics and Gynecology*, December, 1936, xxxii, 1009) reviews 226 cases drawn from private practice during the years 1934 and 1935 in regard to the effect of a pentobarbital-scopolamine-nitrous-oxide analgesia. The criterion of success or failure was based upon the patient's own estimate. The end-results as judged by the patient's testimony were: "excellent" in 91 per cent., "good" in 7 per cent., and "failure" in 2 per cent. There was no maternal death in the series and only two infant deaths, neither of which could fairly be laid at the door of the analgesia. The forceps incidence was 25 per cent. The average first dose of scopolamine was $1/150$ grain, given in conjunction with an average first dose of pentobarbital of $4\frac{1}{2}$ grains. The average interval between the first and second doses was $2\frac{3}{4}$ hours for primiparas and $1\frac{1}{4}$ hours for multiparas. The average second dose was $1/200$ grain, of scopolamine and $4\frac{1}{2}$ grains of pentobarbital. In prolonged labours, when a third dose was necessary, it averaged $1/200$ grain of scopolamine and 3 grains of pentobarbital. Eighty per cent. of multiparas received only one dose. All patients were individualized as far as the dosage was concerned, and all were tested before labour with pentobarbital to discover if there was any idiosyncrasy to the drug but none was found. Damon stresses that the constant presence of the obstetrician is essential to successful analgesia. "Remote control" is consistently unsuccessful. He discusses the various points which have to be taken into consideration as the labour proceeds. Restlessness is one of the great disadvantages of the method. It tends to become particularly marked at the time of delivery, but can be controlled with a small amount of nitrous oxide. There is no diminution of the natural expulsive forces, nor is blood loss or the length of labour increased.

THE TREATMENT OF TYPHOID IN CHILDREN.

IN view of the experiences last summer in this country it is useful to have the views of M. Perrault (*Progrès médical*, January 23, 1937, 137) on the management of typhoid fever in young subjects. He puts the dietetic regime first, consisting of fruit juices, sugar drinks, weak

vegetable soups and diluted milk, if well tolerated. Under-nourishment is probably as dangerous as over-nourishment. Next, rigorous care of all the mucous and cutaneous surfaces of the body and thirdly external measures to reduce temperature, particularly tepid sponging with more rigorous cold packs in hyperpyretic types. For the complication of hæmorrhage, immuno-transfusion is recommended as being definitely superior to ordinary transfusion, and the only three drugs mentioned in this survey are adrenaline to counteract any collapse, and the use of chalk and charcoal to neutralize and absorb intestinal toxins.

SODIUM EVIPAN IN DELIRIUM TREMENS

DELIRIUM tremens is such a serious practical problem that the suggested use of sodium evipan by Perry Sperber (*New England Journal of Medicine*, December 3, 1936, ccxv, 1065) arouses interest. The mortality is approximately 15 per cent. in uncomplicated cases, and much higher when the delirium follows upon trauma or occurs in the course of an infectious disease. Sperber has only three cases to report but they make striking reading. When he first tried sodium evipan he did not expect to produce anything more than its usual twenty-minute anæsthesia, as when given intravenously to achieve surgical narcosis. The first case was a male of 40 years suffering from a typical attack. Six men were required to hold him still enough for the injection to be administered. Two c.cm. of a 10 per cent. solution were injected slowly. Suddenly the patient stopped his mad struggling and relaxed. He yawned lazily and dropped off into a deep sleep. Another c.cm. was injected. The pulse and respiration rates returned to normal and he stopped sweating. After sleeping for four hours the patient awoke for a brief time and asked for a drink of water. He then went off into a deep sleep from which he emerged twenty-four hours later. He had no recollection of the attack and was fully oriented and sensible. The second and third patients behaved similarly and slept for eighteen and twenty-one hours respectively on the same dosage; both awoke free of delirium and with no recollection of it. Sperber feels that three such dramatic results cannot be accidental. He thinks sodium evipan must have a specific action on the nerve centres involved since ordinarily it only acts for twenty minutes, but he justly observes that positive conclusions can only be drawn from a large number of trials.

PERISTALTIC STIMULANTS

POST-OPERATIVE intestinal distension generally causes the surgeon to invoke the aid of one or more of the several preparations reputed to possess the property of peristaltic stimulation. The comparative

merits of these preparations rest upon animal experiments or clinical observation. Only a few experimental studies on the intestine of man have been recorded. To these has been added an interesting paper by J. S. Guthrie and J. A. Bargaen (*Surgery, Gynecology and Obstetrics*, December, 1936, lxiii, 743) who have carried out an investigation upon patients who, for various reasons, had been submitted to colostomy or ileostomy. Their observations were recorded graphically by means of a method that involved introduction of a rubber balloon into the lumen of the transverse colon, sigmoid flexure, and terminal portion of the ileum so that it was possible to estimate the effect of the drugs on different portions of the intestinal tract. Four substances were studied, namely, pituitrin, physostigmine, peristaltin (Ciba) and acetylcholine. Of these four, pituitrin alone was found to be a marked stimulant of the human intestine and, in the light of these results, it is the only drug of this group likely to prove effective regularly as a therapeutic agent in augmenting the peristalsis of an atonic or paralysed bowel. The effect of pituitrin was observed constantly to follow every administration of 1 c.cm. by injection. Vigorous peristalsis occurred within three to five minutes in the terminal ileum and in the transverse and sigmoid portions of the colon. The stimulation extended, with gradually diminishing effect, for from three-quarters to one-and-a-half hours.

A NEW ANTISPASMODIC REMEDY

H. GOLDSTEIN draws attention (*La Riforma Medica*, November 7, 1936, xv, 1511) to a preparation derived from opium called hydrochloride of perparine ($C_{24}H_{29}ONHCl$). It is a microcrystalline powder, of faintly yellow colour, tasteless and slightly soluble in hot water, alcohol, and very soluble in chloroform and ether. He used it first in 1931 as a substitute for papaverine which had not become established, probably given in insufficient doses. Experimentally perparine caused diminution in mobility and tonicity of the small intestines in rabbits. On the intestinal track, perparine in much smaller doses gave better results than papaverine. The spasm provoked by pilocarpine and barium hydrochloride was quickly calmed by a dose half that which was required by papaverine and the relaxing effect lasted longer. It is much less toxic than papaverine and better tolerated in the animals under experiment, and the same effect is observed in clinical medicine and is given from 0.4 to 0.12 of a gramme either by mouth or injection. Favourable results are recorded in the treatment of spastic colitis, constipation, spasm of the pylorus and cardiac achalasia. Its use is also advocated in whooping-cough, laryngeal spasm and angiospastic conditions and disease of the gall-bladder.

REVIEWS OF BOOKS

A Manual of Radiological Diagnosis. By IVAN C. TCHAPEROFF, M.A., M.D., D.M.R.E. With a foreword by PHILIP H. MITCHNER, M.D., M.S., F.R.C.S. Cambridge: W. Heffer & Sons, Ltd., 1937. Pp. 249. Plates 286. Price 21s.

THIS book is written in the style of a synopsis and is lavishly illustrated. A new method of reproducing skiagrams has been used and, although this is successful in the case of bones, it leaves much to be desired in the case of the chest and abdomen. Three-fifths of the text and illustrations are devoted to the skeletal system, and the author is to be congratulated on the result. The normal and the pathological appearances are accurately and succinctly described, and this section can be heartily recommended to students reading for radiological examinations. The heart and lungs, the alimentary tract, the biliary and renal tracts, the female generative system and the nervous system are compressed into the remaining two-fifths of the book. The method of synopsis, applied to description of these parts, is difficult, and in this instance has led to many omissions and errors. For example in the paragraph on pneumonia the author states that the costo-phrenic angle is not opaque unless some fluid is present, and the impression is given that this is a vital point in differential diagnosis. On the same page the author states that fibrin bodies in a pneumothorax have been proved histologically to be composed of layers of fibrin, and in the next sentence he states that these bodies are calcified. It is also regrettable to see that old bugbear, the pleural ring, resurrected as a pathological entity. The heart section occupies only six pages and the line drawings used to illustrate the shape of the heart in various diseases are not in accordance with the generally accepted views. More care should have been taken with the chest illustrations generally, and the diagnoses of plates 205 and 214 require elaboration. The œsophagus, stomach and duodenum and small intestine are more liberally and consequently better described, but the large intestine and the biliary tract again suffer from compression. It is obvious that the author has been cramped for space in the latter half of his book, and the addition of at least another hundred pages is necessary to maintain the high standard set in his description of the skeletal system.

Elements of Orthopædic Surgery. By N. ROSS SMITH, M.B., CH.M., F.R.C.S. Bristol: Messrs. John Wright & Sons, Ltd., 1937. Pp. 246. Figs. 99. Price 10s. 6d.

MR. ELMSLIE, who writes an introduction to this book, explains that the scope of orthopædic surgery has become so extended as to necessitate the inclusion of many assistants who are not medically qualified. Chief of these are the workers in physiotherapy and also those who have to teach physical education. Most of them will not be able to take a medical curriculum, but they ought to have an intelligent knowledge of the principles of structure and function as well as those of diseases and deformity, which constitute the basis of "orthopædic surgery." It is to supply the basis of this knowledge that this book has been planned. The author can be warmly congratulated

on the success of his undertaking. Within the pages of a mere pocket book will be found a short clear account of the chief diseases and deformities of the bones and joints, of the chief types of fractures and of the technique of plaster of Paris work. The brief descriptions of various morbid conditions and appliances are amplified by numerous clear illustrations. The book certainly deserves a place on the desk or in the pocket of every worker in the field of orthopædics.

A Textbook of Medicine. By CHARLES PHILLIPS EMERSON, M.D. Philadelphia and London: J. B. Lippincott Company, 1936. Pp. xxv and 1296. Price 36s.

APPOINTMENT by the trustees of Indiana University as Research Professor of Medicine has afforded Dr. Emerson the opportunity of preparing this volume in which the clinical approach to the subject predominates. The book begins with a description of "acute coryza" at the start of the section on specific infectious diseases which is not only a change from the more usual "typhoid fever" but being infinitely commoner serves to put emphasis in the proper place. This balanced outlook is continued throughout the book and a skilful use of small print paragraphs and footnotes has enabled the author to give a complete picture of disease and its treatment without obscuring the essential clinical facts on symptomatology, diagnosis and general management. The production as regards print, paper and binding is of a high standard and an index of nearly ninety pages appears to be remarkably complete.

Vade Mecum of Medical Treatment. By W. GORDON SEARS, M.D., M.R.C.P. London: Edward Arnold & Co, 1937. Pp. vii and 368. Price 10s. 6d.

THIS is an alphabetically arranged collection of short practical notes on the medical treatment of common disorders. The author has clearly had extensive experience of hospital work and this makes his accounts of how to manage a patient with pneumonia, for example, excellent. On the other hand experience in general practice or even perhaps in mere out-patient work would have improved his descriptions of treating the more chronic disorders which are not entirely disabling. To say under "dyspepsia" that "spa treatment or Weir Mitchell regime may be necessary for the most severe cases with neurasthenia" is far removed from the practicalities of life. Perhaps before a new edition is prepared, Dr. Sears will ask an experienced general practitioner to go through the volume with a blue pencil. The bulk of the material is so good that it would be well worth this type of revision. Despite these adverse remarks the book can be cordially recommended to house officers and senior students: it will be of great help during their hospital years.

The Facial Neuralgias. By WILFRED HARRIS, M.D., F.R.C.P. Oxford University Press, London: Humphrey Milford, 1937. Pp. xi and 109 with 15 illustrations. Price 7s. 6d.

It is convenient to have grouped in one slim volume the views on facial pain and its relief which have been expressed by Dr. Wilfred Harris in the

past few years. The detailed treatment of trigeminal tic is particularly valuable, being based upon a long experience of successful management of this troublesome disorder. The monograph on migrainous neuralgia is also a useful contribution to medical literature.

Hay Fever: with special reference to treatment by internasal ionization. By CLIVE SHIELDS, B.M., B.CH. Oxford University Press, London: Humphrey Milford, 1937. Pp. 57. Price 7s. 6d.

THIS is a simple exposition of this method of treatment of hay fever with more modest claims than were made in the lay press last year. It is stated that in 1936, 51 out of 72 patients so treated received complete freedom from all symptoms. On the other hand it is unfair to suggest that other methods are as unsuccessful as the records of patients attending for ionization treatment represent, for clearly only failures are likely to seek further treatment. Full details of the process of ionization are given.

Contributions to Clinical Practice in Medicine and Surgery by Members of the Staff of the Southend Hospital. Edited by T. ROWLAND HILL, M.D., M.R.C.P. London: H. K. Lewis & Co., 1936. Pp. vii and 205. Illustrations 125. Price 12s. 6d.

THE Southend Hospital must be congratulated on the production by its energetic staff of a volume containing 24 articles by 22 authors. These cover a wide field, for the special departments including anæsthesia, radiology, and dentistry are duly represented. The volume is very generously illustrated especially in the articles dealing with gynæcology and operations; skiagrams are numerous, and attention may be drawn to one of an anencephalic foetus in the pregnant uterus. The articles include records of rare cases, such as congenital cystic disease of the lungs, and also general reviews such as those of the fracture problem, radiological diagnosis of gastro-intestinal disease, and some aspects of the cancer problem. It indeed would be difficult for a medical reader not to be interested in one or more of the articles.

NEW EDITION

The Extra Pharmacopœia of Martindale and Westcott. Vol. i (The Pharmaceutical Press, and H. K. Lewis & Co., 22s. 6d.) This invaluable source of reference, which is probably more familiar and widely used than the official British Pharmacopœia by the rank and file of the medical profession first appeared in 1883. First edited by Mr. William Martindale and Dr. William Wynn Westcott, a coroner, a man of wide interests and an authority on magic and alchemy, the *Extra Pharmacopœia* was carried on by W. H. Martindale, who died in 1933, his death being largely attributed to his self-sacrificing devotion to this book. The question then arose "What is to become of the Extra Pharmacopœia?" The Council of the Pharmaceutical Society of Great Britain then stepped into the breach, and thus have earned the gratitude of the profession for this service in addition to responsibility for the *British Pharmaceutical Codex*. The two volumes are very different, the *Extra Pharmacopœia* containing an enormous amount of documentary evidence about the therapeutics of drugs and preparations.



NEW HOME FOR *THE PRACTITIONER*

DURING the month of April it is anticipated that new premises at 5, Bentinck Street, W.1, will be available for occupation. This move into the medical quarter of London will enable subscribers and contributors to make a more personal contact with the editorial and managerial staff than has, perhaps, hitherto been possible. The existing offices in the heart of the newspaper world have become too small for modern requirements and although previous moves from offices in the Strand and in Howard Street have been eastwards, it is hoped in the present change to the west to find a permanent home.

As a suitable building could not be found it was decided to build, and a lease of No. 5, Bentinck Street was taken from the Howard de Walden Estate. The exterior is Georgian in type, to be in accord with other buildings in the district. The architect is Mr. Howard Robertson, F.R.I.B.A., of the well-known firm of Messrs. Stanley Hall & Easton and Robertson. Internally, the building has many novel features, such as a circular staircase, a round lift, a new system of air-conditioning and, in a portion of the building, a completely new form of electric panel heating. The furniture and fittings are new throughout, and have been specially designed. It is hoped to issue an illustrated supplement on the new building in May or June. Subscribers are invited to visit the new building when completed, and make use of the reading room where copies of over one hundred medical periodicals from all the world will be available for perusal.

NOTES AND PREPARATIONS

BRITISH HEALTH RESORTS ASSOCIATION CONFERENCE AT BOURNEMOUTH, 12 TO 14 MARCH, 1937.

SIR JAMES MARCHANT discussed the subject of "Wintering in England" in regard to its broad and non-technical aspects. There is no country which has so many types of landscape or exhibits such wealth of ever-changing variety within the narrow boundaries of one district. Should there not be a comprehensive scientific inquiry into the entire business of running health resorts with a view to placing them upon a more enlightened and a stable foundation? Lord Horder, Vice-President of The Association, affirmed his belief in the future of British health resorts. English weather is beyond control, but weather is not climate. Climatically the south coast has advantages in winter. The medical profession has insufficient knowledge in regard to the selection of climates for various types of patients. There is also insufficient information concerning the therapeutic value of sea-water. Further research is necessary so that there may be a basis of ascertained fact to help us advise our patients. Dr. Collis Hallowes of Torquay urged that those who desire to know the truth about British winter resorts should study the Handbook of The British Health Resorts Association compiled by a sub-committee of the Medical Advisory Committee. Marine resorts should develop their possibilities as winter health resorts as well as summer holiday centres. Such development requires that local corporations must give attention to the outdoor and indoor amenities and facilities for visitors. Professor Kestner of the Rowett Institute, Aberdeen, began the discussion on "The Curative Action of Sea Climate." Sir W. Langdon-Brown and Dr. Watson Smith also joined in the discussion. From the early days of the town it has been recognized that cases of tuberculosis benefit from residence in Bournemouth. Other conditions for which Bournemouth is specially suitable are non-tuberculous respiratory disease, valvular and myocardial heart disease, hypertension and chronic renal disease.

NEW PREPARATIONS

FOLINERIN.—This is an active principle isolated as a glucoside in pure crystalline form from *Folia nerii oleandri* and it is claimed to have therapeutic effects of a digitalis-like nature but with certain advantages over the ordinary digitalis glucosides. It may be administered in all conditions in which digitalis would normally be given and it is stated to be better tolerated. Tablets containing 0.1 mgm. of the glucoside are available in bottles of 50 from Schering Limited, 185-192, High Holborn, London, W.C.1.

VITEOLIN.—This is the registered name now being used for the Glaxo Laboratories preparation of wheat germ extract. To explain the indications and actions of vitamin E, the active agent in viteolin, a booklet has now been issued which gives a thorough and up-to-date survey of the whole subject. Copies may be obtained from Glaxo Laboratories Ltd., Greenford, Middlesex. This vitamin is particularly indicated in habitual and threatened abortion and in sterility.

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THE TREATMENT OF A CASE OF HYPERTENSIVE HEART DISEASE

By W. T. RITCHIE, O.B.E., M.D., P.R.C.P.E.

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Royal Infirmary, Edinburgh.*

A PATIENT is said to be affected with hypertensive heart disease when he presents the cardiac manifestations which may develop late in the course of the extremely frequent disorder known as hyperpiesia, essential hypertension, vascular hypertonia or, in ordinary parlance, "high blood-pressure". This familiar disorder, which begins insidiously, is usually first manifest in middle life and runs a prolonged course over a period of many years, both the systolic and the diastolic blood-pressures are unduly high, for example, 180/120 or 200/150 mm. Hg. The adjective "essential" applied to hypertension indicates that this is not secondary to any obvious organic disease such as Bright's disease or thyrotoxicosis. The treatment of the patient should be undertaken, not by a specialist, but by the patient's own family medical practitioner. The latter is the proper person to regulate and supervise the protean symptoms that may arise at any time.

PROPHYLAXIS

As the causation of hyperpiesia is still most obscure, no hard and fast rules can be formulated to prevent its onset. Although hereditary factors, which often play an important part in its causation, are beyond the patient's control, hypertensive heart disease is often the last phase, long drawn out, of a life of great physical or mental activity. If any man's or woman's family history in respect of arterial disease is unfavourable, they should therefore be careful, particularly

after reaching the age of forty, not to lead an unduly active life, but to be moderate in all matters even if some ambitions and pleasures have to be renounced. The harassed housewife is almost as prone to become hyperpietic as is the overwrought business man. The prevention of hyperpiesia implies avoidance of much of the stress and strain of modern civilized life. Its economic embarrassments, business worries and financial anxieties, its restlessness and pursuit of pleasure are potent factors in causing hyperpiesia, probably because of their prejudicial influence upon the endocrine organs. Toxæmia of every kind should be avoided. If the man has been a heavy smoker, his tobacco ration should not exceed one pipe or one cigarette after each meal. Although the precise relation between faulty digestion and hyperpiesia is still in doubt, faulty dietetic habits must be corrected. There must be no over-indulgence in the pleasures of the table; the use of alcohol should be relinquished. Further, the potential hyperpietic, whether he is obese, burly and of active habits, or of spare build and sedentary disposition, needs regular active exercise in the open air. Advice along these lines, given repeatedly by the family practitioner may, it is hoped, retard, if not prevent, the onset of essential hypertension.

THE FIRST STAGE

Once hypertensive heart disease has developed, the treatment and care of the patient depend upon the stage of the disease, its extent, and severity. In the first stage, which usually lasts for many years, the hypertrophied heart is still maintaining an efficient circulation despite high arterial blood-pressure. When the condition is found in persons of advanced years who enjoy good health, no treatment is called for. Hypertensive heart disease is often detected in the course of routine medical examination of middle-aged patients, for example for life assurance. The man may feel well, look robust, have a fresh or florid complexion and be a typical example of "red hypertension", without presenting any symptoms of cardiac failure. The appearance of the retinal arteries may be characteristic,

but there is as yet no retinitis; the urine is healthy; the kidneys can still eliminate freely an extra load of water and concentrate urea satisfactorily; a biochemical examination of the blood does not reveal any nitrogen retention. The general measures that are applicable to the potential hyperpietic should be applied strictly to such a patient. His daily mode of life must be regulated most carefully; his work must be cut down in order to avoid undue fatigue; he must delegate to others many of the duties of his business or office and relinquish many of his social obligations. He should begin to cultivate a hobby and must have ample sleep. If circumstances permit, the week-end should be spent quietly in the country, where mild active exercise out of doors is to be encouraged. Gardening and golf are desirable. Days of leisure must not be spent in the car or playing cards.

The food should be simple, light and digestible. A dry diet is prescribed because it encourages efficient mastication. Three meals a day, not four or five, should be the rule. Nothing is gained by rigid limitation of first-class protein. Fish, eggs, chicken and game, unless it is high, are allowed. But red meat—and this term includes not merely beef, but also mutton, lamb, ham, bacon, tongue and sausage—should not be eaten more than once a day. Liver, kidney and sweetbread should be avoided. The intake of salt need not be restricted. Fats are allowed in moderation; milk, fruits and vegetables may be taken freely; cereals and sugar need not be curtailed unless the patient is obese, in which case he should be given an appropriate diet in order to reduce his weight. Alcohol in every form is harmful to the hyperpietic. Attention must be paid to elimination. A tumblerful of hot water or a large cup of weak tea should be taken about an hour or half an hour before breakfast, and a similar quantity of water before the midday and evening meals. It is often well to prescribe tincture of rhubarb and compound infusion of gentian, or compound rhubarb powder, to be taken half-an-hour before meals. Liquid petroleum, cascara, phenolphthalein or other mild laxative may be needed; a blue pill may be taken one night

each week and a Seidlitz powder or other effervescent saline next morning. The daily bath should be warm; as it promotes diuresis; hot baths increase the cardiac output.

If inquiry reveals any grossly infective foci in the mouth, nasal sinuses, pelvic organs, or elsewhere, the problem of their elimination will have to be considered. It is well to maintain a conservative policy which regards such foci as concomitant evils, rather than the causes, of the hyperpiesis.

THE SECOND STAGE

After the lapse of several years, perhaps eight or ten, the disease has advanced to the second stage and the patient is suffering from angina pectoris or from palpitation because of cardiac hypertrophy, paroxysmal outbursts of extrasystoles or other gross disturbance of the cardiac mechanism; he may complain of intense and persistent headache or of throbbing in the head, or may recently have suffered from a retinal hæmorrhage or bleeding from nose, lung, kidney or elsewhere. He must now have a thorough rest in bed for at least one month. Under the influence of the enforced rest, physical and mental, a milk diet, a mild hypnotic each night and regular laxatives, he may begin to feel better in the course of a few days and coincidentally the blood pressure, previously far too high, declines to a lower, less abnormal, level. He must now retire from work and will need prolonged care on these lines.

The walls of the arterioles, which for long have been in a hypertonic state, are now, slowly but almost certainly, becoming sclerosed and the arterial blood-pressure is being maintained at an abnormally high level in order that the tissues and cells of the body may receive an adequate supply of blood. It is therefore unwise to lower the high blood-pressure in a case of hypertensive heart disease by means of drugs. Moreover, in many of these cases the high blood-pressure is "stable" or "fixed"; it does not fluctuate widely from day to day and is little, if at all, influenced by rest in bed, sleep, diet and the usual vasodilators. Potassium iodide is widely employed, but has little, if any, direct influence upon

either the well-being of the patient or his blood pressure. Thyroid is of value in the myxœdematous and obese group of hyperpietics. Perchloride of mercury is often prescribed in small doses ($\frac{1}{64}$ – $\frac{1}{32}$ grain), twice a day after meals, in the dubious hope that it may be an intestinal antiseptic. Many proprietary substances, containing nucleotide, mistletoe, tissue extracts or choline derivatives, which are claimed to be useful vasodilators, are ineffective orally. The continued use of vasodilators should be regarded as a confession of failure. But some hyperpietics, whose blood pressure is unstable, are liable to suffer from angina pectoris, due possibly to paroxysmal hypertonia of coronary arterioles; others suffer from paroxysmal headache, vertigo or cerebral angiospasm, because of temporary elevation of the systemic blood-pressure in excess of that which is customary for the individual. On these occasions when a prompt vasodilator may be needed, a tablet of glyceryl trinitrate (about $\frac{1}{130}$ grain) should be chewed, not swallowed whole. For more prolonged use the $\frac{1}{2}$ theobromine sodium salicylate, (5 grains) or theophylline æthylenediamine ($\frac{1}{2}$ grains) may be administered thrice daily. Although it has little direct influence upon the blood pressure, venipuncture at intervals of six to eight weeks is of distinct temporary benefit in some cases of hyperpietic heart disease. Twelve or fifteen ounces of blood can easily be withdrawn by inserting a French's venipuncture needle into a vein at the bend of the elbow, the needle being connected by rubber tubing with an aspirating bottle.

THE THIRD STAGE

Many years after the hyperpiesia and cardiac hypertrophy were first recognized by the family practitioner, the patient passes into the third stage, that of congestive heart failure. The myocardium has become enfeebled and the heart dilated. The blood-pressure readings slowly decline, so that the arterial hypertension is now masked. The fall of pressure occurs, not because the patient's condition has improved, but because the heart is failing, and when the failure is pronounced the pressure

falls to subnormal levels, for example 108/70 mm. Hg. The patient becomes short of breath upon effort; within a few months he will be breathless even while he is resting and will be dropsical. The heart usually maintains its normal rhythm, but auricular fibrillation is not infrequent. The fundus oculi often shows signs of retinitis.

When hypertensive heart disease has reached this stage the patient should be confined to bed, and made as comfortable as possible by the use of an air mattress, a bed-rest and a bed-table to support the arms and head when he leans forward. As the appetite and digestion are impaired a plain milk diet, three or four pints in the twenty-four hours, is given, with the addition of about a pint of glucose-orangeade, composed of glucose, $\frac{1}{4}$ lb., the juice of two oranges and one pint of water. When the patient's condition improves in the course of a few days we can add one or other of the pre-digested invalid foods and milk pudding. He may then have a low protein diet, containing approximately carbohydrate, 222 gm., protein, 30 gm., and fat, 26 gm., as follows:—milk, 10 ounces; cream, 5 ounces; porridge, two tablespoonfuls; bread or toast, 3 ounces; butter $1\frac{1}{2}$ ounces; milk pudding, stewed fruit and sugar, of each 2 ounces; cauliflower or other digestible vegetable, 6 ounces and two oranges or apples. Subsequently steamed white fish, poached egg and chicken may be added. It is seldom advisable to restrict the intake of fluid, even if the patient is dropsical; but if the dropsy persists a salt-free diet should be given, the bread and vegetables of the above-mentioned diet being prepared without salt. There is less need for strict adherence to a low protein diet than there is in some cases of nephritis. Indeed, if the intake of protein is restricted too rigidly or for too long a period, hypo-proteinæmia will develop; a low albumin content of the blood-plasma and consequently a decrease of its colloid osmotic pressure promote the onset of dropsy.

The heart being dilated and its rate too rapid, digitalis is needed. If the pulse is regular, a daily dose of 20–30 minims of the tincture will probably need to be given for several weeks. The therapeutic action of digitalis in slowing and strengthen-

ing the ventricles and promoting diuresis is more evident when the auricles are fibrillating than when the heart is maintaining its normal rhythm. In hyperpietic fibrillators it may be expected that the administration of sixty minims of digitalis tincture daily will, in the course of two or three days, lessen the dyspnoea, lower the ventricular rate, perhaps from 150 to 80 per minute, abolish or lessen the pulse deficit and increase the flow of urine. It is immaterial which preparation of digitalis is prescribed, provided sufficient is given to produce the desired therapeutic effect. The dose of digitalis should then be reduced until a daily "maintenance dose," neither too little nor too much for the individual case, is being taken. The effect of digitalis is greatly enhanced by the administration of a diuretic. One of the most effective is theobromine sodium salicylate, given in doses of 10-15 grains thrice daily after meals. This may be expected to raise the daily output of urine to about two litres, lower the body weight by about ten to fourteen pounds in a week or a fortnight and enable the patient who had been forced to sit up, distressed, breathless and sleepless, to breathe comfortably and sleep peacefully in the recumbent posture. Theophylline sodium acetate is a less efficient diuretic. Ammonium chloride in doses of 20 grains thrice daily acts well in many cases, as also does urea (150-200 grains thrice daily). Albuminuria due to venous congestion of the kidneys does not contra-indicate the giving of urea, but it should be withheld if there are further signs of renal disease. The introduction of mersalyl and other organic mercurial preparations as potent diuretics marks an important advance in the treatment of congestive heart failure, because their use almost entirely obviates the time-honoured methods for the relief of cardiac dropsy by Southey's tubes and other mechanical means. These diuretics can be given intravenously, intramuscularly or, most conveniently, in the form of suppositories; they should be administered in the morning, not in the evening, lest the profuse diuresis amounting to four or five litres within twenty-four hours should exhaust the patient during the night. The com-

bination of a mercurial diuretic with theophylline in the form of a suppository is most advantageous, and the diuresis is still more profuse if the administration of twenty grains of ammonium chloride thrice daily was begun two or three days previously. Mercurial diuretics should not be given more than twice a week. Their administration is inadvisable when renal damage is revealed by the presence of granular tube-casts in the urine; they are contra-indicated when renal activity is seriously impaired, as shown by the kidneys having a low urea-concentrating power and the blood yielding an abnormally high figure for urea nitrogen or non-protein nitrogen.

Hypnotics are often needed, especially if the insomnia is due to headache or throbbing in the head. Chloral hydrate, 15 grains, in combination with potassium bromide, 30 grains, is still one of the best and safest remedies. Chloralamide, 30 grains, paraldehyde, $\frac{1}{4}$ – $\frac{1}{2}$ oz., phenobarbitone, 1 grain, or one of the other barbituric preparations are also good hypnotics. If any hypnotic fails to induce sleep, it should be repeated in two hours. In the late phases of the disease all these hypnotics will probably fail. Recourse may then be had to morphine, but this should be given most cautiously if the lungs are œdematous or the urine is scanty. If a rapid diffusible stimulant is needed, aromatic spirit of ammonia is the remedy of choice. Alcohol is best administered as whisky or brandy in hot water. An intramuscular injection of camphor in oil, or one of the substitutes for camphor, may be given in a sudden emergency.

THE TERMINAL PHASE

When the disease enters its terminal phase congestive heart failure is an exceedingly frequent, but not the only, danger. Those who have been sufferers from angina pectoris on effort are especially prone to succumb to coronary thrombosis. To others the end comes abruptly by cerebral hæmorrhage, which is particularly liable to ensue if hæmorrhages have taken place into the conjunctiva or retina. In others there is progressive, perhaps rapidly progressive, renal failure, indicating the onset of the condition which is sometimes termed

“malignant hypertension.” The failure may develop within a few weeks. The urine, which formerly contained a little albumin, becomes loaded with albumin and granular tube-casts; the concentrating power of the kidneys fails steadily, perhaps rapidly; there is progressive nitrogen retention, the blood urea-nitrogen rising, for example, to 60 mgm. per cent. or more. The appetite fails and can no longer be stimulated by carminative mixtures. The patient becomes drowsy by day; his sleep is disturbed by Cheyne-Stokes breathing, which may be relieved by oxygen freely administered by means of a two-way nasal catheter or a light mask at a rate of six litres per minute; but in many cases oxygen therapy affords no relief. Sleep is also liable to be broken suddenly by most distressing paroxysmal nocturnal dyspnoea, for the prompt relief of which morphine is usually the sole remedy. Vomiting may recur notwithstanding the administration of dilute hydrocyanic acid, opium and morphine. Restlessness may demand sedatives; to control delirium opium or even morphine and hyoscine may have to be given. Twitching of muscles and other manifestations of uræmia may develop, before uræmic coma closes the scene.

THE TREATMENT OF A CASE OF ANGINA PECTORIS

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ANGINAL PAIN

SO much has been written lately on the subject of anginal pain that there is little new to be said in regard to its treatment, but it may be helpful to review the position and attempt to gain a sense of proportion, to stress those measures which are of moment and at the same time recognize the futility of much of the routine medication. The first thing to be realized is that standardization of treatment is impossible. Anginal pain is not a disease but a symptom and the cause for the pain must be sought. It is the resultant of many factors. Each patient is a new problem and the success or failure of treatment depends largely on the care with which the various factors both etiological and pathological are sought for and assessed. "Intimate individual study is the essential of success."

The fundamental physiological basis of anginal pain is a relative ischæmia of the heart muscle and pain is the cry of the myocardium when deprived of an adequate blood supply. Pain is the sequel to a defective coronary circulation; when this fails to wash away the end products of muscular contraction, pain ensues. The greater the work of the heart, the more need there is for an augmented flow of blood with its supply of oxygen to flush the myocardium. With the varying activities of life the flow of blood through the coronary vessels is constantly altering to meet the changing demands of the myocardium. Under normal conditions the coronary circulation has ample reserves but, when from any cause the lumen of a coronary artery is diminished, and the circulation is no longer able to meet the extra demands of effort or emotion, the patient is pulled up by pain. Anginal pain is evidence that the demand of the heart for blood exceeds the supply. It is therefore necessary to consider what factors increase the work

of the heart and determine how far they are capable of being controlled or modified, and it is advisable to remember that the incidence and degree of distress will vary with alteration in the threshold for pain.

Impairment of the coronary circulation is usually the result of narrowing of the lumen of a coronary artery consequent on arteriosclerosis, a condition which is beyond repair. Or, the stenosis may be transient and caused by spasm of the artery, a spasm which for its duration diminishes the flow of blood. It is more than probable that this arterial spasm occurs in an artery already damaged.

When a coronary artery is suddenly occluded by thrombosis an area of myocardium is deprived of its blood supply and suffers necrosis—coronary infarction. This is a cardiac accident and manifests itself chiefly by the “status anginosus.” This must be differentiated from anginal pain of the effort or spasmodic type, in which the pain is evidence of a temporary inadequacy of function as the treatment of the two conditions differs fundamentally.

Not only is the quantity of blood flowing through the coronaries of importance, but also the quality. For example, it is well known that anginal pain occurs in patients suffering from severe grades of pernicious anæmia. The hæmoglobin content of the blood is, therefore, a factor to be watched. I have already referred to variations in the level of the threshold for pain. This is more particularly worthy of consideration in women who complain of precordial distress or submammary pain. The above factors are those usually present in varying degree in patients prone to anginal attacks and they are independent of the work of the heart. It is known, however, that the liability to pain in such predisposed patients is intensified and an attack precipitated by any action or condition which increases the demands on the heart.

ADVERSE FACTORS

These can be summarized briefly: they are of importance because to some extent and in varying degrees they can be modified by treatment. Of these, bodily activity comes first.

Secondly the weight of the body is important—overweight is a serious and unnecessary handicap to the heart. A high blood-pressure must also be recognized as a condition which without cessation adds to the heart's burden. Lastly, the rate of the heart is hastened by effort and is one factor in the distress caused by exercise in anginal patients, but a tachycardia from any cause is harmful whether it is excited by emotion, thyrotoxicosis, or a pathological rhythm. The heart hurry may unmask a potential angina.

GENERAL MANAGEMENT

In discussing his condition it is important, first of all, to be frank with the patient as to the nature of the pain. Its significance must be explained to him and stress laid on the fact that angina is not a disease *sui generis* but merely a symptom due to many factors, some of which it is in his power to remove or modify. The ground having thus been prepared, it is necessary to indicate those factors in his particular case for which change is necessary, either in habits or in various commitments. The patient must recognize that without full co-operation on his part, success cannot be expected. If the advent of anginal pain is recent and the attacks are becoming more frequent and severe, a period of complete rest for a few weeks is indicated and during this enforced absence from business the whole field of his activities can be scrutinized, with the object of deciding what modifications in his mode of life are advisable. There are some patients of a restless temperament who bear bed badly. In such it is futile to attempt to compel complete rest in bed unless the pain is due to coronary thrombosis. In these patients full dosage with ammonium bromide is valuable by inducing mental calm.

This preliminary period of rest is the opportunity for remodelling the mode of life so that when the patient returns to his work he does so having shed as much of his burden as is in his case desirable. Obviously those activities which are essential to his financial stability and to his happiness in life should be interfered with as little as possible, but all others must be viewed critically, and all wasteful expenditure of energy should

be eliminated. The routine of his office work should be lightened, and it is wise when possible to unload some of his responsibilities, especially those that are uncongenial, on to other and younger shoulders. Every week-end is an opportunity for rest and contentment, of which full advantage should be taken. An anginal patient, harassed through the week, ought not on the Sabbath to encroach on his mental and physical reserves by philanthropic or other altruistic activities. Sleep being the most important form of rest, ten hours in bed should be the minimum. Early to bed and a quiet hour or two reading before sleep are advisable. The amount of exercise to be taken and its nature are always of importance. The myocardium, like every other muscle, is the better for exercise and the aim must be to keep the exercise just short of the point of causing distress. Experience soon teaches a patient the limits of his powers and within those limitations the more exercise in the open air he is able to take the better both for the myocardium and the man. There are a few simple rules which he must obey:—

At the first indication of pain or discomfort—slow down or stop, and do not attempt any particular form of exertion which from past experience he knows will bring on an attack.

After a meal always rest awhile—the gastro-intestinal tract has then a first call on the available blood supply.

Choose as a companion, either in a game or for a walk, someone who is less active and do not attempt to walk and talk at the same time.

Avoid excitement and irritation—they tend to precipitate an attack : to some patients bridge is a dangerous game, others find it wiser not to watch a football match.

Any sudden change from a warm to a cold atmosphere increases the liability to anginal pain. There are patients who are peculiarly sensitive to a cold atmosphere: it is a good plan to warm their bedroom before the time for retiring and the bed itself should be warmed.

Sitting, half-stripped, in a chilly lavatory is foolhardy. Unfortunately most lavatories are first cousins to a refrigerator and such are certainly no places for an anginal patient.

DIET

Diet requires careful consideration, for dieting is infinitely more important than drugging. Flatulence should be avoided, the meals should be small, the food simple and easily digestible. Five small meals are far better than three large ones: the stomach should never be loaded. Anything more than a moderate allowance of fluid with a meal is undesirable. If the

patient is overweight, then a stricter regime should be laid down. The intake of starches, fats, and sugars must be carefully limited until the patient begins to lose weight. Beer is bad for the obese: if the patient feels that some form of alcohol is essential to his comfort then a small amount of light wine or whisky and water may be allowed. A steady loss of weight should be maintained until the optimum weight is reached, and then some latitude allowed in regard to food so long as the weight does not increase. Here, the sincere and intelligent co-operation of the wife is most necessary and it is well worth while taking some pains to make sure that she grasps the importance of the slimming regime.

Exercise in the obese anginal patient is necessarily limited on both counts and it is helpful to combine general massage with graduated exercises: the general musculature is improved thereby and as the weight diminishes with a corresponding increase in the myocardial reserve, exercise is more easily tolerated. Thyroid should on no account be prescribed to assist in the loss of weight.

OTHER MEASURES

Questions are certain to be asked about tobacco. On the whole it is better avoided but if the patient finds it a serious deprivation then a smoke after meals is a reasonable compromise. Those who find that the first cigarette of the day causes slight giddiness or faintness should certainly not smoke.

A diligent search should be made for any possible source of sepsis—attention must specially be paid to the teeth and gums, the tonsils, and accessory sinuses. Anæmia, primary or secondary, requires the treatment appropriate to the particular type. Serious consideration must be given to the nervous element in a patient's temperament and especially to the level of the threshold for pain. This may be lowered by the recurrent attacks or by adverse features in his life, such as worry, anxiety and so forth. When the threshold for pain is below par, sedative drugs prove most helpful: bromides—such as ammon. bromide 20 grains nocte, theominal, or luminal, or other sedatives are indicated. It is a question if routine treatment

with the various preparations of theobromine has any direct action on the myocardium or coronaries but many patients find comfort from the routine drugging and on those grounds, if on no other, some such medication is justified.

The presence of a duodenal ulcer or chronic disease of the gall-bladder may affect the liability to anginal attacks by a gradual lowering of the threshold, and if there is any suspicion as to the presence of such disease then a full investigation should be carried out and adequate treatment instituted.

The administration of insulin and glucose has proved of service in diminishing the liability to attacks and I have noted in one case an increased frequency of the attacks when, inadvertently, the daily dose of insulin had been omitted.

Short-wave diathermy has also been found to be helpful both in patients with hyperpiesia and those with normal pressures.

TREATMENT DURING AN ATTACK

An attack of angina should not be allowed to develop. Every patient soon recognizes the prodromal symptoms—the peculiar discomfort so often labelled “indigestion,” substernal or epigastric in site, or the initial pain localized at a wrist or above the elbow, or in the suprasternal notch. His reaction to this warning must be immediate. All activity must cease. Usually with the rest the pain becomes easier but if, in spite of rest, the pain persists he should slowly chew a tablet of trinitrin 1/100 grain and repeat this dose if the pain is not relieved. (The tablet is much less effective if swallowed whole.) This is the best of the vasodilators, but the tablets deteriorate after six to eight weeks and it is wiser to buy only a small supply at a time. A strong carminative is also helpful especially in the less severe attacks accompanied by ærophagy. Brandy, either neat or slightly diluted, frequently enables the patient to eructate, but I find the following draught more effectual:—

R	Mentholis	-	-	-	-	-	-	10 grains
	Spts. ammon. co.							
	Spts. chloroformi							
	Tr. card. co.							
	Tr. zingiberis	-	-	-	-	-	āā	1 ounce

Sig. : Two teaspoonfuls to four tablespoonfuls of water.

This should be carried in a flask for use as occasion demands.

SURGICAL TREATMENT

When, in spite of a carefully regulated life and all the more usual methods of treatment, anginal attacks are making life intolerable, surgical treatment deserves consideration even if it can do nothing more than relieve the pain. The possible advantages to be obtained by the operative treatment of duodenal ulcer, or cholelithiasis have already been mentioned. If there is underlying thyrotoxicosis, either complete removal of the thyroid may be attempted or, as a less severe operation but one yielding satisfactory results, ligature of the vessels may be carried out—ligature of both the inferior and superior thyroid arteries as close as possible to their origin. Injection of the paravertebral sympathetic is another method by which anginal pain is relieved. In view of the difficulties and dangers associated with operative interference this method of attack can only be advised in those patients proved by experience to be resistant to every other line of attack.

CORONARY THROMBOSIS

The treatment of a patient suffering from anginal pain due to coronary thrombosis lies in an entirely different category from that of the other varieties of cardiac pain just discussed. First, there is the profound shock associated with the sudden occlusion of the coronary vessel, and secondly it must be borne in mind that there is an area of myocardium which has been destroyed with the result that there is in the wall of the heart a patch of softened and necrosed muscle liable to yield under the stress of intraventricular tension. Also, at an early stage in the illness thrombi are deposited which may become separated and discharged into the circulation. These facts must be remembered in the management of each case, more particularly during the first few weeks. Absolute rest, mental and physical, must be enforced. This is necessary to obviate the danger of a ruptured ventricle or the dislocation of an adherent thrombus. The risk of such a happening diminishes rapidly after the second or third week.

The patient should be confined to bed: a bed-pan should be

used, and food should be administered by a nurse or other attendant. In any case, it is wise to enforce the rules in regard to bed for a minimum of four weeks, preferably eight weeks, to enable the thrombosed area to recover and scar tissue to strengthen the weakened area of the myocardium. At the onset the most important treatment is the relief of pain. Vasodilators are useless. Morphine is essential and must be given in adequate doses— $\frac{1}{4}$ grain repeated every half hour until the agonizing pain is assuaged. If, as rarely happens, the pain persists in spite of morphine then some general anæsthetic is indicated. Light ether anæsthesia, or gas and oxygen are the anæsthetics of choice: chloroform is dangerous.

The relief of pain is one element in diminishing the element of shock. If the shock is profound (as manifested by a sudden and serious drop in the blood pressure, grey ashen complexion, and profuse sweating), then measures must be taken to alleviate the collapse. Hot bottles, warm blankets, and raising the end of the bed are necessary.

Stimulation of the heart is without danger at this period as thrombi have not formed and the muscle, although damaged, is not semi-diffuent. Even so, it is questionable if it is wise to take any dramatic measures to raise the blood pressure provided it is maintained at a level compatible with life. If, however, the systolic pressure has dropped dramatically towards the 100 mm. Hg level and there is evidence of defective renal secretion, then stimulation is indicated. Coramine, cardiazol, caffeine, or adrenaline may be given with advantage. A sudden drop in the blood pressure with associated sluggish circulation predisposes to further thrombosis and to that extent is dangerous.

The sudden onset of persistent and distressing dyspnœa accompanied by collapse and apprehension is characteristic of further infarction. Here again the distress is relieved by morphine and the administration of oxygen. Such an attack adds greatly to the gravity of the prognosis.

Any evidence of anoxæmia, especially if associated with cyanosis, is a clear indication for further treatment with oxygen. This can most easily be administered by a nasal catheter—if the patient will tolerate this method—and should be given for

at least an hour at a time.

Further treatment is largely that of careful nursing, mental and physical rest, and the meeting of any adverse symptoms as they arise. The patient will probably be constipated as the result of the administration of opiates. Distension of the abdomen is dangerous but any active purgation should be avoided. The bowels should be opened by enemas and some gentle laxative such as one of the preparations of paraffin given to prevent inspissation of the stools. For the first days fluids are all that are required in the way of food. The patient is probably dehydrated as a result of the profuse sweating so that an ample allowance of water, weak tea, coffee, fruit juices and glucose should be given. Careful attention to the toilet of the mouth is important.

After the first few days when the pain has been relieved and the condition of shock has passed, mental rest is imperative. It is wiser to veto visitors, and any mental work or other excitement should also be forbidden. In a highly-strung or temperamental patient it is sometimes difficult to obtain this mental rest and a sedative is necessary—either a mixture of bromide, bromide and chloral, or drugs such as theominal 5 grains, luminal $\frac{1}{2}$ grain, or prominal 1 grain. The diet must be light, food should be simple, and each meal small in bulk.

If auricular fibrillation supervenes and is not merely of the short paroxysmal type, digitalis is indicated. Digitalis is also of service in the event of progressive congestive failure, but otherwise I question if it is a useful drug in patients suffering from coronary thrombosis.

At the end of the month, if all goes well, the rigidity of the discipline may be modified, but for at least two months from the onset of the attack physical effort of any kind must be carefully regulated and the effects of any experiments carefully noted. It is specially important to note whether effort causes any recurrence of anginal pain of the effort type. Such a symptom can be met by the medication already described under the heading of effort angina (p. 567).

After the first few months a gradual return to a more normal life is justified as long as it is clearly recognized that for the future, life must be lived at a lowered level of effort.

THE TREATMENT OF A CASE OF THYROTOXIC HEART DISEASE

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ONE of the milestones which guided clinicians in their study of cardiac maladies was the recognition of the thyrotoxic state in its relation to heart disease. As a result of clinical observations and biochemical investigations, the thyrotoxic heart occupies a much more important place now than twenty years ago in the practice of those who have to treat the patient with a cardiac disability. It has long been common knowledge that heart failure can develop as a terminal event in exophthalmic goitre, but it is only within recent years that a clearer conception of the close connection between the thyroid gland and a functional derangement of the cardiovascular system has simplified the treatment of certain forms of heart disease.

The rational treatment of the patient with thyrotoxic heart disease requires knowledge of the inter-relationship of the thyroid gland and the heart. The chief effect of thyroid secretion is the stimulation of the metabolic processes of the body tissues, and a constant feature of hyperactivity of this gland is an increase in the metabolic rate. The basal metabolic rate can be measured accurately, and by such measurements excess of thyroid secretion can be determined. A raised basal metabolic rate is evidence of increased oxygen consumption; it represents too, an increase in nitrogen, carbohydrate, and fat metabolism; it is a record of nitrogen loss, of a lowered tolerance of glucose, and of excessive fat oxidation.

CHANGES IN THE THYROID GLAND

Iodine is an essential constituent of the thyroid, and if the gland receives an inadequate supply of this element its glandular structure hypertrophies, and the colloid substance of the gland, in which the iodine is stored, is reduced in amount or may entirely disappear. When the iodine content of the gland falls below a certain level from a diet poor in this element, or because the supply is inadequate for other reasons, characteristic hyperplastic changes are observed. At a later stage the

glandular cells may atrophy, and if iodine is given the colloid accumulates and the hyperplastic gland becomes a colloid goitre. Any of these transitional changes in the anatomical structure of the thyroid may be observed in a patient with toxic goitre. There may be in one individual a colloid goitre which has become nodular and fibrous from hyperplasia; in another an adenoid goitre develops from a healthy gland. There are many variations in the structural changes, and any one of the transitional stages may be associated with a toxic state. The pathological changes in the gland are not closely related to the clinical manifestations of the disease. The thyroid is enlarged, but the degree of enlargement is not evidence of the severity of thyrotoxæmia. A large colloid goitre may not be toxic, and an intense intoxication can occur when a nodular thyroid is relatively small. In the grouping of goitres some clinicians are satisfied with a simple classification such as toxic and non-toxic goitres; others prefer to qualify the toxic goitre as primary when a previously healthy thyroid has become toxic, or secondary if a toxæmia develops in a hitherto non-toxic goitre. Exophthalmic goitre and toxic adenoma are descriptive terms in common use. Hyperthyroidism is a familiar synonym for either condition.

CARDIAC SYMPTOMS

Thyrotoxic heart disease presents a symptomatology caused by the general effect of the toxic state on the different tissues of the body, and the special effect of abnormal secretion of the thyroid upon the cardiovascular system. Females are more prone to this disease than men, with the highest incidence between twenty and thirty years and at the menopause. Thyrotoxic subjects are usually restless irritable patients with a fine tremor of the hands, with exophthalmic or staring eyes, and wide palpebral fissures. They have lost weight, and have occasional attacks of diarrhoea; the skin is moist and warm, has a fresh colour and is often pigmented. They complain of easy exhaustion, general weakness, and particularly of palpitation. The cardiac signs are those of an overacting heart with a pulse rate of 120 or more at rest, a diffuse impulse, and an apical systolic murmur. These signs suggest cardiac enlargement, but in a large proportion of cases there is no increase in the

size of the heart. When the heart is enlarged, it is more often the left ventricle alone, and there is usually some dilatation of the pulmonary artery which, in many, does not alter the normal shape of the cardiac outline. The systolic blood-pressure is often raised to 150 mm. Hg or higher, and the diastolic pressure is low. Capillary pulsation is frequently observed in association with increased skin temperature; it is a sign of vasodilatation, an effect of the raised metabolic rate, which is a constant feature of a thyrotoxic state. This cutaneous vasodilatation is the chief cause of an abnormal sensation of warmth at ordinary room temperature. The thyrotoxic patient is only comfortable with the window open, with the bed clothes light, or at a room temperature which others find cold.

GENERAL MANAGEMENT

Thyrotoxic heart disease is a chronic malady, and in its natural course there are short or long periods of remission. Symptoms that are conspicuous in some may be absent in others. Variability in the intensity of the toxæmia throughout the illness is the cause of the alternating character of the toxic manifestations, and may depend on such accessory factors as environment, constitutional type, sepsis, and age changes in the cardiovascular system. All of these influences have to be considered in assessing the toxic element in the clinical picture and in the treatment of the disease. When home conditions are unhappy and difficult, the removal of the patient to other surroundings where there is peace and contentment is a therapeutic measure likely to control the course of the malady in its early stages. If there is no improvement as a result of a change in environment, a resting regime is indicated, with breakfast in bed, two to three hours rest in the afternoon, and going to bed soon after the evening meal; a short walk in the morning, and a drive in the afternoon may be allowed. If there is no gain in weight, and tachycardia and other nervous manifestations of the disease remain unchanged, complete rest, apart from a daily bath and the use of the lavatory, is required for at least a month. In these circumstances a congenial nurse is desirable, and the patient should be isolated as much as possible from other members of the family; such treatment can

best be carried out in a hospital or nursing home. Sedatives in large enough doses to promote sleep should be prescribed—bromides 30 to 40 grains, or luminal 1 to 2 grains daily are to be recommended as valuable drugs for this purpose. A generous mixed diet is required, and massage two to three times a week will help to maintain the tone of the body muscles. This treatment is likely to prove ineffective if the toxic state is being activated by sepsis. Dental sepsis should be dealt with by the extraction of teeth, at intervals of a week or ten days when there are many. Tonsillar sepsis seems to aggravate a toxic goitre more than sepsis in other parts of the body; a history of recurring attacks of tonsillitis in association with signs of infected tonsils is an indication for a tonsillectomy. The enucleation of the tonsils should be preceded by the administration of iodine. It is usual to give Lugol's solution 10 minims t.d.s. for ten days before the operation. The tonsillar enucleation may have to be postponed until after a thyroidectomy has been done in a very toxic case. The same rules apply in the treatment of sinus infections.

In the middle-aged adult, when degenerative changes of the cardiovascular system may be expected, the heart muscle is more vulnerable to toxic processes, and cardiac enlargement, hypertension and auricular fibrillation are conspicuous features of the disease. The nervous manifestations of toxæmia are less often observed, and the clinical phenomena of heart failure in its different aspects predominate. Auricular fibrillation is common at this age, and bears a close relationship to thyrotoxæmia. It may occur in paroxysmal attacks or as an established rhythm. The ventricular rate is rapid and not easily controlled by digitalis in doses usually prescribed in non-goitrous subjects. Quinidine fails to restore the normal rhythm or only for a short time. Symptoms and signs of heart failure are not much influenced by the measures commonly employed in the treatment of auricular fibrillation and heart failure in other patients. The signs of a thyrotoxic state may be so masked by the cardiovascular signs that if not suspected they are not easily recognized. In the absence of rheumatic heart disease, hypertension, or coronary atheroma, auricular fibrillation with heart failure is due in a large proportion of cases

to toxic goitre.

SURGICAL TREATMENT

If, after six months of medical treatment, the symptoms and signs of a toxic state still prevail, or, if auricular fibrillation has developed and is known to be of toxic origin, the treatment most likely to prevent or arrest heart failure is a subtotal thyroidectomy. Digitalis should be given in full doses when there are signs of heart failure. Absolute rest is indicated as in other forms of congestive failure. A common practice is to prescribe tinct. digitalis, 60 minims daily in divided doses for eight days, and half doses afterwards up to the day of the operation. The ventricular rate will remain moderately raised on this dosage; there is a risk of digitalis intoxication if larger doses are given with the object of reducing the rate below 90. When there is gastric intolerance with vomiting intravenous injections of digoxin should be given. It must be diluted with 10 c.cm. of normal saline and the initial dose is 1 mgm. followed by a daily maintenance dose of 0.75 mgm. Salyrgan injections given intravenously or intramuscularly in bi-weekly doses of 1 to 2 c.cm. are indicated if there is much reduction in the output of urine. The effect of this, the best of all diuretics, is increased by prescribing ammon. chlor. 30 grains with syrup of orange in an ounce of chloroform water t.d.s. The fluid intake should be kept within 30 ounces daily; a chloral mixture may be given to induce sleep, and morphine prescribed if there is respiratory distress. Iodine in the form of Lugol's solution 10 minims t.d.s. should be given for ten days before the operation. Potassium iodide $1\frac{1}{2}$ grains three times a day may be prescribed in place of Lugol's solution; the effect is the same. When possible a surgeon should be chosen who has special qualifications in the surgical treatment of thyroid disease, for he must decide if the operation is to be in two stages, if a preliminary ligation of the vessels is required, and how much gland tissue should be resected. It is desirable to continue the Lugol's solution in daily doses of 5 to 10 minims for three months after the operation. A spontaneous reversion to normal rhythm occurs in about half the cases as a result of the operation; it can be restored with quinidine in half of the remaining cases. An initial dose of quinidine is 3 grains,

on the following days 6 grains morning and evening, on the third day 6 grains t.d.s., on the fourth day 6 grains four times daily. If the normal rhythm has not returned, increase the dose to 30 grains daily, and continue on this dosage for a week or ten days. When quinidine has failed to restore the normal rhythm after a week of 30 grains daily, it is rarely effective if continued over a longer period. It is usual to give quinidine 6 grains two to three times daily for a month or six weeks after the normal rhythm has been restored. Some prefer to wait a fortnight or three weeks before giving quinidine; others begin it within a week of the operation. In those patients with auricular fibrillation as an established rhythm after operation digitalis is indicated in doses large enough to control the ventricular rate; 20 to 30 minims of the tincture daily is usually required to keep the resting rate between 80 and 90. A convalescence of three to six months is advisable for all patients.

The blood pressure may remain high and the heart enlarged in spite of treatment; such patients must be treated as for hypertensive heart disease, and their activities kept within the limits of their cardiac reserves. Those left without any damage can lead active lives, but should avoid a too strenuous life, and not fancy themselves completely cured.

IRRADIATION

Those who refuse operation can be helped by irradiation of the thyroid gland: good results have been recorded particularly in the primary toxic group. It is usual to give four to six treatments at weekly intervals in small doses. The administration of iodine in small doses over a long period is prescribed by many. It is best to reserve its use for patients who do not improve with rest. A dose of 5 minims daily of Lugol's solution can be given over a period of months, and, combined with rest, will hasten a recovery by producing an iodine remission which allows a few cases to lead a comparatively subnormal life.

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THE TREATMENT OF A CASE OF CONGENITAL HEART DISEASE

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THE treatment of a case of congenital heart disease is limited in its scope by the very nature of the condition. The lesions are present fully developed from birth. No measures of prevention can be applied nor is there an active disease process to be checked. The kind of damage to the heart is rarely, if ever, capable of relief by direct interference with the heart or its coverings. Treatment therefore is confined to adapting a damaged individual to a life which shall be as nearly as possible normal. Within these limitations the effects of treatment are not to be despised. A patient whose lesion is dramatic in its physical signs, yet causing no impairment to cardiac efficiency, may be rescued from a life of invalidism. Other patients may be guided into tolerable ways of living even though the damage to their hearts is irreparable.

ESTIMATION OF SEVERITY

It follows then, that the first step in arranging treatment in any particular case is to determine to what degree the function of the heart has been damaged. With certain exceptions it is possible to arrange the patients into one of three groups. The first group consists of those who have such severe damage to their hearts that they cannot survive birth by more than a few days or weeks. The second is made up of those whose lesions, though severe, are compatible with a life of limited activity and stress. The third group are the more fortunate persons who have congenital heart lesions which do not in the least interfere with cardiac efficiency. The second group is clearly the one which deserves most consideration in the matter of treatment.

The description of the various forms of congenital heart disease can be found elsewhere and nowhere better set out

than in the work of Maude Abbott. It is no part of the present purpose to attempt a classification of the heart lesions or to present exhaustive lists of those which need treatment and those which need none. The decision to which group a patient belongs for the purposes of treatment can usually be made immediately by a clinical examination. For instance, a child with ectopia cordis, whose case was recently recorded by Kellett, could not be regarded as viable and was therefore wisely made as comfortable as possible for his short life without meddlesome attempts at treatment.

Similarly, a baby seen not long ago with extreme cyanosis resulting from gross pulmonary stenosis with a "shunt" through her interventricular septum was regarded as untreatable. She had been brought to hospital at the age of one day. Her chest bulged from the enormous size of her heart; she had rapid panting respirations. In a modified oxygen tent her symptoms were somewhat alleviated; but it was clear from the first that prolongation of her life by such means would be of no service to her and would raise false hopes in the minds of her parents.

In the same way it is often possible at the first examination to pick out those patients whose congenital heart lesion is not going to be disadvantageous to them either by shortening their lives or by cutting down their capacity for physical work. The best example of a lesion of this type is a patent ductus arteriosus. This condition can readily be recognized on auscultation and, when it is present as the only cardiac abnormality, the patient or his parents can be reassured finally and completely as to its insignificance.

Most cases, however, fall into the second group; their cardiac abnormalities are easily noticed, their true nature can often be identified but it remains uncertain from a clinical examination alone how far they are hampering the heart in its work. In such cases further aid in examination may profitably be called in. A skiagram, besides giving information of the size and shape of the heart and any abnormalities in its outline, provides a valuable record which can be compared with skiagrams repeated after a lapse of time. Of less use are electrocardiograms. Sometimes they provide most bizarre tracings indicating damage to conducting pathways; rarely do they help in determining whether or not the heart can do its work. Of much more use are simple exercise-tolerance tests,

provided that the patient is old enough to carry them out. Just as in acquired heart disease, they give a good rough approximation of the amount of cardiac reserve. Last, though it is of no use in giving an immediate prognosis, is the observation of the progress of the patient. Most patients with congenital disease of the heart are young when the condition is first recognized, either having been seen because of the symptoms of their disease or the condition being found in the course of an examination for an intercurrent illness or a school inspection. In the cases in which there is doubt whether the patients needs supervision or not, the progress over a few months or years in the last resort supplies the answer. Normal increase in weight does not occur with the more serious lesions. A mild case may be symptomless when first seen, yet the appearance of signs of distress as the child grows larger indicates that the patient is one who needs supervision and treatment. Two kinds of heart lesion in particular often present problems of this nature. One, the child who has a patent interventricular septum with a systolic murmur best heard in the third and fourth spaces just to the left of the sternum. The opening in the septum may be small and never likely to embarrass the heart, whereas on the other hand it may be large with an associated abnormality of the aortic orifice and considerable increase of the load on the right ventricle. The other instance is the patient with dextrocardia. Here again, if the heart and the great vessels bear the exact mirror-image relation to the normal, there is no reason to think that the heart cannot work as well as when it is arranged in its usual way. Yet there are many forms of dextrocardia in which the relation of the great vessels and their openings are grossly abnormal and in some of these forms cardiac efficiency is greatly diminished. A case presenting this problem has recently been under observation.

A boy aged eleven years was sent to the hospital for investigation because for eighteen months he had had bouts of fever lasting each time several weeks. He was found to be well-grown, and he looked well. He was afebrile in hospital. He had several carious teeth. The glands in his neck were enlarged. Apart from this, the only other abnormalities found were that his cardiac impulse was to the right of his sternum with

a visible apex beat in the right fifth intercostal space just outside the nipple line, and his liver seemed by percussion to be on his left side. A skiagram (Fig. 1) of the chest confirmed the dextrocardia and suggested

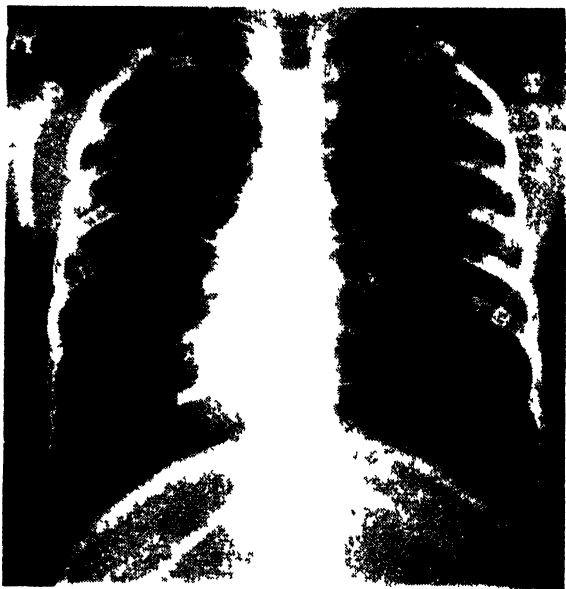


FIG. 1

that the aortic arch passed to the right. Further skiagrams after a barium meal showed transposition of liver and other abdominal viscera. Pulse rate, blood pressure and exercise tolerance were normal. The electrocardiogram (Fig. 2) was abnormal only to the extent to be expected with this condition. It was felt that in view of this boy's satisfactory growth and the absence of symptoms referable to his cardiovascular system, he should not be regarded as needing any treatment for his congenital abnormality of the heart nor should his activities be curtailed on that account.

THE CASE OF NO SIGNIFICANCE

In this clinical case and in what has been said before, the importance of deciding whether or not a congenital lesion is causing any embarrassment to the heart has been stressed. It is one of the most essential parts of the treatment of these cases to avoid unnecessary restrictions on a patient's way of living. Parents are sometimes made miserable and a child turned into a tyrannical invalid all because diagnosis of congenital heart disease has rightly been made but its unimportant nature either not understood or not explained. To conceal the presence of an abnormality of the heart, even though it is of no importance, serves no purpose. Sooner or later its presence is

disclosed and unnecessary recriminations follow. A full and intelligible explanation of the state of affairs allows the patient

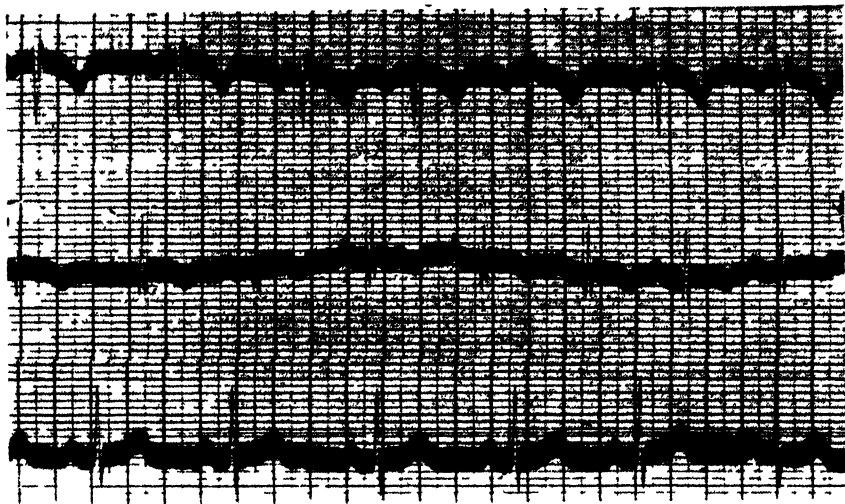


FIG. 2.

a normal life and ensures that he will go to any medical examination armed with the knowledge of the extent and the significance of his abnormality.

THE CASE NEEDING TREATMENT

Exemption from all restrictions can be allowed to few of those who have congenital heart disease. Most patients have lesions which require more active treatment than merely a release from fear; but even in these cases care should be taken that worry about the heart condition is not allowed to bulk unreasonably in their daily life. Perhaps the most characteristic type of case in this group is the child who has a pulmonary stenosis with cyanosis, enlargement of the heart and polycythæmia. He gets excessively breathless if he runs or if he walks upstairs. His parents want to know what are his chances of growing up and what they can do to increase them. To answer the first part dogmatically is difficult, for everyone is familiar with patients with morbus cæruleus reaching adult life and earning their livings in sheltered occupations, and are similarly familiar with such patients failing to survive the chance illness of childhood and adolescence. The solution of the second part of their inquiry comprises the bulk of the

treatment of congenital heart disease. The management of these cases falls under three headings : (a) the regulation of exercise; (b) the anticipation and, as far as possible, prevention of intercurrent disease; (c) education for a suitable vocation.

It has already been said that normal life should be disturbed as little as possible in the course of treatment. This rule should be applied to the regulation of exercise. The amount allowed to any patient should just fall short of what will produce abnormal breathlessness and an increase of his other symptoms. Thus, if it is found that a child can walk for three miles without fatigue and without dyspnoea he should be encouraged to do so. In another case the limit of his powers may be reached at a much earlier stage; he can move about successfully on the level but he cannot climb stairs or a hill without distress. He must therefore be provided with his rooms on a ground floor preferably with a ready access to a garden. In making these arrangements two other considerations must be borne in mind. Even to those with the least disability, occupations with sudden and incalculable stresses, such as football and swimming, must be denied. Though exercise within the patient's tolerance should be encouraged, it must be in a form which can be measured in advance. Second, the regime of any particular case must come up for periodical review. A lesion such as pulmonary stenosis or a gross patency of the interventricular septum tends to become progressively more embarrassing as the patient increases in size. The lumen of an abnormal pulmonary artery may remain the same even though a patient doubles his weight and his blood volume and thereby increases the required output from his heart. In such an instance, exercise that was safe at the age of three, might be unreasonable when the child reached the age of eight. The periodic review of exercise allowance, besides contributing to the child's safety, gives valuable information of his progress in relation to his disease and is a necessary part of his management.

The second aspect of the treatment of these cases, the prevention of intercurrent disease, is really only an exaggeration

of the prophylactic measures applied normally during childhood. Because a child with a damaged heart might not survive, say, an uncontrolled attack of measles, preventive measures against this and as many other diseases as possible must be carried to extremes. The patient must be effectively immunized against diphtheria and a skin test repeated at intervals of five years to make sure that he remains Schick negative. After a probable exposure to scarlet fever he should be given a passive immunity by an injection of the appropriate serum. Such an immunity lasts only for about three weeks so that subsequent exposures make necessary further doses of serum with the usual precautions of desensitization. Against measles, in the severer cases of heart disease, a similar procedure using convalescent serum may be necessary. In the milder cases it is wiser to allow the patient a controlled attack of measles, i.e. to administer convalescent serum five days after a known exposure, and thereby secure an active and more or less permanent immunity from this disease as a result of a modified attack.

Upper respiratory infections can to some extent be guarded against by careful observation of the tonsils and adenoids and their removal if they appear to become infected and functionally useless. For yet another reason, all sources of pyogenic infection must be closely watched in children with congenital heart disease. Every now and again a child dies, not from the developmental damage to his heart, but from a super-added bacterial endocarditis. It seems likely that some of these disasters may be prevented by a timely attention to focal sepsis.

Besides these more particular measures against intercurrent illness, it is obvious that there are other common-sense measures to be carried out. The patients must be isolated from members of their households who have colds and other infections. In their earlier years, at any rate, it may be wise to keep them away from school during the spring terms for similar reasons. Of quite as great importance is the attention to food and fresh air. The diet should be simple and adequate, but it helps the patients if they are prevented from becoming obese. Town

children should have long holidays in the country. In the case of the poorer patients, outside help has often to be called on to obtain the country holidays and sometimes to secure proper food.

Advice concerning the vocation for which a patient should be trained may be an important part of treatment. If the parents of a child with congenital heart disease can be made to understand early the limitations that will have to be imposed, they and the child usually adapt themselves readily to new aims. When it is known, for instance, from the first that a son cannot follow his father into the army or into work as a dock labourer, the idea of a sedentary occupation becomes acceptable and the possibilities can be explored.

THE UNTREATABLE CASE

Nothing can be said about treatment of cases which from birth are seen to be hopeless. Humanity forbids the raising of false hopes in the minds of the parents. If the condition is certainly incompatible with life, the kindest course to follow is removal of the baby soon after birth to a hospital or elsewhere, away from its mother. Fortunately, such severe lesions are rare. In the great majority of cases of congenital heart disease treatment can prolong life and can help both the patient and his relatives to a peace of mind which they would otherwise lack.

SUMMARY

The treatment of congenital heart disease may be briefly stated as :—

- (1) Measurement of the degree of cardiac embarrassment.
- (2) Exemption from all restrictions, and from fear, of those whose lesions are unimportant.
- (3) For the more severely affected, guidance about the amount of exercise allowable, prevention of intercurrent illness, and preparation for a vocation within their physical ability.

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THE TREATMENT OF A CASE OF SYPHILITIC HEART DISEASE

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SYPHILIS is probably responsible for from five to ten per cent. of all cases of cardiovascular disease, and syphilitic disease of the cardiovascular system is the most immediately fatal cause of death in syphilis. As a rule the time interval between the primary infection and the manifestation of cardiovascular syphilis is from ten to twenty years, but in exceptional cases the interval may be reduced to as short a period as two or three years. At the present time there appears to be some increase in the incidence of syphilitic cardiovascular disease, and this is probably due to the fact that the Great War produced the usual crop of venereal infection.

PATHOLOGY

In order that a clear conception be obtained as to the rationale of the treatment of any disease, it is essential to have a clear view of the underlying pathological conditions. The exact route of infection followed by the spirochætes in this condition is not known. Until comparatively lately the most usually accepted view was that the infection was blood-borne and that the organisms were, during the secondary stage, deposited in those various organs which eventually showed signs of localized disease. The view of Carey Coombs in an excellent review of this condition¹ shows some variation from this conception. He thought that the stages of the development of the disease could be divided into three. The first was the stage of primary infection; the second that of bacteriæmia; and the third was the stage of generalized lymphadenitis. He believed that the spirochætes lay dormant, not in the structure of the aorta or in the spinal cord in the two diseases, syphilitic aortitis and tabes, respectively, but that they invaded these structures after a long latent period during which they sur-

vived in a more or less inactive state in the substance of the lymphatic glands. Thus in the case of the heart the dormant spirochætes in the mediastinal lymphatic glands would, after a considerable interval of time, and as a result of some factor or stimulus as yet undetermined, find their way by way of the lymphatics to the adventitia of the aorta. They would travel from this through the perivascular lymphatics surrounding the vasa vasorum of the aorta and would thus penetrate the structure of the vessel, and incidentally produce an inflammatory endarteritis of these nutrient vessels. There is a good deal of experimental, histological and anatomical evidence to support this view.

The essential cardiovascular lesion of syphilis is the aortitis. This primarily arises in and is largely restricted to the medial coat. The lesion is associated with a good deal of œdema, possibly some slight transient local hyperæmia, and by the usual histological changes of subacute or chronic inflammation. The final result is destruction of the elastic tissue of the aorta, and its replacement by fibrous tissue. The heart is affected almost entirely in a secondary manner, as a result of this aortitis, and the essential changes are two in number. The most striking of these is the production of aortic regurgitation. The second and possibly the more serious is partial occlusion of the mouths of the coronary arteries where they pierce the inflamed aorta. The aortic regurgitation is produced by two different mechanisms; either there is a sufficient stretching of the aortic ring to prevent the normal aortic valve cusps from meeting, or there is a definite inflammation of the aortic cusps. Syphilis attacks the valves by direct extension of the inflammatory process from the aorta, and the first changes are to be seen in the valve commissures which become œdematous and thickened. As the process continues the cusps themselves become œdematous, softened, partially fibrotic and more friable. They ultimately become distorted by advanced fibrosis, or may even rupture. The explanation of the way the coronary orifices become partially nipped in the inflamed aorta needs little further expansion. It may, however, be stressed that the remainder of the course of these vessels is generally quite normal, and that coronary thrombosis is never

found as a result of a syphilitic lesion alone. When this complication occurs, it will be found that a mixed syphilitic and atheromatous disease co-exists.

SYMPTOMATOLOGY

A description of the symptomatology of the disease is essential because its successful treatment depends almost entirely upon sufficiently early diagnosis. The symptoms which bring the patient for treatment can be subdivided into three groups: those of aortic regurgitation, those of the interference with coronary blood flow, and those which are due presumably to an associated mediastinitis.

The symptoms of aortic regurgitation are the most striking of those found in these patients, but they obviously mark a comparatively late stage of the disease. Shortness of breath is not prominent at first. The symptoms of excessive pulsation and of the excessively vigorous ventricular systole, are sometimes the first to be complained of. The patient may state that his cardiac action keeps him awake or even shakes the bed. Syncope is rare. It is striking to find such an advanced valvular lesion with such slight symptoms, and the explanation is that although the valvular lesion may be fairly advanced there is not any associated myocarditis. This state of affairs is in striking contrast to that presented by patients with aortic regurgitation due either to rheumatism or to degenerative heart disease. Syphilis should be suspected as the cause of an aortic regurgitation if this lesion is found in a patient between thirty-five and fifty-five, who has previously been in good health, in whom there is no history of rheumatism, and no sign of mitral disease, or in whom no evidence of hyperpiesis is present. Syphilis should be suspected again if aortic regurgitation is found in an individual who is known to have had a normal heart some five or ten years previously, and whose age is between thirty-five and fifty-five. The fact which helps to establish this may be that he was in the army or navy and therefore had been passed as physically sound, or that there had been a definite history of a life insurance examination. A point of finer distinction could be made in the differential diagnosis of syphilitic aortic regurgitation due to

a stretched aortic ring on the one hand, and the same valvular lesion which is due on the other to syphilitic distortion of the aortic cusps. If on listening over the aortic base the regurgitant murmur is heard associated with a definite clear second sound, it is probable that the valve cusps are still elastic and can still be filled out sharply by the regurgitating blood; if no clear aortic second sound is heard, it is probable that the valve cusps are fibrotic and incapable of flexibility. I described a case in which aortic regurgitation due to syphilis was proved at autopsy to be due to stretching of the ring, and in this case the valve cusps were normal.² During life a definite aortic diastolic thrill had been palpable. Whether the presence of such a diastolic thrill is in fact a distinguishing point between these two types of aortic regurgitation needs further statistical proof. A final point in differential diagnosis is worth stressing. Most cases of aortic regurgitation which are due to syphilis produce a murmur which is most audible to the right of the sternum; most cases in which the lesion is due to a rheumatic carditis produce a murmur which is heard best to the left of the sternum.

The second group of symptoms suggesting syphilitic interference with the heart includes those due to interference with the coronary flow. The most characteristic of these is angina of effort, which is produced by a sufficient diminution in blood flow to cause some myocardial ischæmia when the patient exercises beyond a certain level. The pain complained of in these cases is exactly quantitative to the degree of exertion undertaken, increases with more exertion, and dies away with rest. It is felt substernally in most cases, but occasionally over the precordium, and may radiate to the arms. This symptom may exist with or without an associated aortic regurgitation. It may here be stressed that the large majority of cases of pure angina of effort are due to coronary atheroma, producing the degenerative heart disease. The most frequent associated findings in this group are that the patient is aged fifty or more, that the blood pressure, systolic and diastolic, or diastolic alone, is frequently raised, and that the heart shows clinical, radiological, and electrocardiographic evidence of enlargement or myocardial disease. Syphilis, on

the other hand, not infrequently produces an angina of effort at a somewhat earlier age, the blood pressure is generally normal, unless changed by an associated aortic regurgitation, the heart is normal in size, again unless aortic regurgitation is present, and the electrocardiograph shows no abnormality except at an advanced stage of the disease. This picture of a pure angina of effort with a normal heart and a normal blood-pressure is characteristic of syphilitic aortitis, and the Wassermann reaction in such cases must invariably be tested.

The third group of symptoms suggesting a syphilitic aortitis is less easily defined. The symptoms have been described by a number of observers; the most constant of them is pain in the chest, having no quantitative relation to exercise, and which is frequently worse at night. This pain may radiate through to the back, to the left chest, to the shoulder or the back of the neck, and its most noticeable clinical characteristic is its apparent disregard of any cardiac localization or radiation. Carey Coombs described a case in which it was aggravated by swallowing. Posture too, frequently has a definite effect in accentuating this pain, which may be worse on lying on the right or the left side.

There are two further physical findings which are suggestive of cardiovascular syphilis, besides aortic regurgitation. The first is dilatation of the aorta, shown either by an increased dullness in the second and third spaces to the left of the sternum, or by radiological evidence of increase in the size of the aorta; if this enlargement is associated with a heart normal in size the evidence favouring a syphilitic lesion is even more suggestive. The second physical sign worthy of especial notice is a ringing and accentuated second sound at the aortic base, associated with a low or a normal blood-pressure. The Wassermann reaction should always be tested in cases in which cardiovascular syphilis is suspected; but it must be remembered that the reaction is only positive in between 75 and 85 per cent. of proved cases of syphilitic disease of the aorta. It therefore follows that should the clinical evidence be sufficiently strong, a full course of antisymphilitic treatment should be given both prophylactically and because a definite amelioration of symptoms as a result may be helpful in clinch-

ing the diagnosis.

TREATMENT

The essential fact to be kept in mind in considering the treatment of syphilitic heart disease is that although the valvular lesion is often gross, symptoms of heart failure or, indeed any symptoms at all, are frequently absent. The disease may be discovered in the course of routine medical examination in apparently healthy men between the ages of forty and fifty, who are in hard physical employment. If therefore aortitis can be healed, and the syphilitic infection arrested, there is no theoretical reason why the left ventricular muscle should not recover lost ground and subsequently hypertrophy to make good the purely mechanical deficiency. Even if the syphilitic disease has produced the symptoms of angina of effort, by some obstruction to the coronary orifices, there is again no reason why healing should not occur, leaving an adequate coronary flow. It thus appears theoretically that syphilitic aortitis should be curable; but this conclusion is to some extent denied by the facts available as to the prognosis in patients with syphilitic heart disease. Carey Coombs, in his review referred to above, described the expectation of life as shown by the figures of different writers. The conclusion, as a generalization, is that the majority of patients died within from three to five years of the discovery of the disease. This somewhat gloomy outlook is not borne out in my experience, for a number of cases of proved syphilitic heart disease, in the Follow-Up Clinic of the Cardiographic Department of St. Bartholomew's Hospital, have survived up to periods of seven or eight years, with amelioration or even loss of their symptoms.

It must be remembered that there are two factors necessary for successful treatment of any disease; the treatment must be potentially efficacious, and the treatment must be adequately given to the patient. In the case of the adequate treatment of syphilitic aortitis, two variables enter into the equation, the physician's persistence and the patient's willingness. The rule which governs the treatment of this disease is that the patient must have antisyphilitic treatment until the Wassermann reaction becomes and remains negative. From two to three full courses should be given every year until this result is

obtained. Seven or eight of such courses may be necessary until the reaction becomes negative, but the outlook as regards life appears to be greatly improved in patients who have been willing to follow this routine. There are, of course, a number of patients who become tired or disheartened at the apparent hopelessness of achieving the desired result, and of course in private practice it may be that the patient is unwilling to proceed for financial reasons with a programme which appears to be so indeterminate. It is essential therefore before starting the treatment, to explain fully to the patient the powers of resistance of the disease to treatment, the possibility of arrest, and the relatively good outlook as regards future life should this arrest be achieved.

There are definite dangers in the treatment of syphilitic aortitis by the arsenical preparations intravenously. The most prominent is the Herxheimer reaction. This is referred to by most writers on the subject and the risk is a real one. The reaction is due to localized œdema at the site of the lesion, presumably induced by the lytic action of arsenic on the local spirochætes. The effect of this œdema upon the aorta where it is pierced by the coronary arteries need not be great to reduce suddenly and considerably the coronary flow. Clinically the usual result is sudden death within twenty-four hours of the injection. It appears to be possible to avoid this reaction by a preliminary treatment with mercury, potassium iodide and a course of bismuth injections. The potassium iodide appears to be the more valuable of the first two drugs mentioned. A good programme is to give the following prescription:

Pot. iod.	-	-	-	-	-	15 grains
Liq. hydrarg. perchlor.	-	-	-	-	-	60 minims
Calomel.	-	-	-	-	-	q.s.
Aq. chlorof.	-	-	-	-	-	ad $\frac{1}{2}$ oz., t.d.s., p.c.

The dose of potassium iodide should be increased every three or four days by 10 or 15 grains until the patient is taking up to 180 grains of potassium iodide per day. It will be found that these large doses have little or no unpleasant effect in the majority of cases. When this treatment has been administered for a month to six weeks, a course of bismuth injections, *injectio bismuthi* of the British Pharmacopœia, is given in

doses of 1 c.cm. per week, for twelve successive intramuscular injections. Following this, neokharsivan, or some similar preparation, can be given intravenously. The first dose should be 0.15 gramme; if there are no reactions of any kind 0.3 gramme can be given, and this dose can be increased to 0.45 in the third and subsequent injections. The interval between doses should be one week. The total dosage of the complete course should be about 3.5 grammes. The whole of this programme should be repeated two or three times per year until the Wassermann reaction becomes and remains negative.

It is necessary to decide whether the patient can be treated while up and about, or whether rest in bed is necessary. The following simple rules are probably adequate. The treatment may be completely ambulatory in syphilitic aortitis without aortic regurgitation, when it has been discovered either by accident or from the presence of angina of effort. Ambulatory treatment is safe in aortic regurgitation which has been discovered accidentally, when no symptoms are present, or when such symptoms have been slight, and have completely subsided as a result of the administration of mercury and potassium iodide. These ambulatory patients should keep regular hours, take plenty of sleep and normal food, avoiding taking by the mouth an excess of fluids with their meals, or substances which are likely to produce gastric distension. They should avoid physical overstrain of all kinds, the excessive use of tobacco and much alcohol. In most cases the normal routine employment, provided this is not physically exacting, can be followed. Treatment should be given in bed if the symptoms are marked, if shortness of breath on exercise is definitely present, and if anginal pain is severe, except in those rare cases in which these symptoms subside rapidly as the result of mercury and potassium iodide. Treatment in bed is also desirable even in the absence of symptoms if the degree of aortic regurgitation is considerable, for example, rather arbitrarily, if the diastolic pressure is below 40 mm. mercury; treatment in bed is essential if there are any signs of congestive failure.

Symptomatic treatment in severe cases is necessary. If the patient is suffering from congestive failure it is probable that rest in bed alone will improve this considerably; but digitalis is

not contra-indicated and is useful in the somewhat rare cases when auricular fibrillation is present. The usual barbiturate sedatives and hypnotics can be safely tried if sleeplessness is present, but there is no contra-indication to the use of morphine in persistent insomnia. The condition of one patient was progressively improved after he had been given four or five successive good nights by the use of morphine, the drug being later cut down in amount and subsequently discontinued. Salyrgan, by intramuscular or intravenous injection at intervals of five days, is very helpful for œdema. It should be preceded for forty-eight hours and accompanied by the administration of ammonium chloride 15 grains, aq. chloroformi ad $\frac{1}{2}$ oz., t.d.s., p.c.

PROGNOSIS

The prognosis is probably not so bad as is generally stated, provided that treatment is thorough. There is no indication in most of the published statistics as to the completeness of treatment in the individual cases. It may be stated therefore that the prognosis is likely to be better than is generally assumed, provided there is a thorough and complete antisymphilitic treatment; but that the prognosis tends to be less favourable if there is a marked degree of aortic regurgitation, or if there is evidence of definite myocarditis, as shown electrocardiographically by the presence of a bundle-branch lesion, by inversion of the T-waves in leads I and II, and the presence of auricular fibrillation. Severe congestive failure does not necessarily mean a rapidly fatal outcome, but is, of course, a serious sign. In conclusion it may be stated that syphilitic myocarditis is definitely rare, but that localized gumma formation in the neighbourhood of the bundle of His accounts for a certain percentage of cases of complete heart block. The old conception that rupture of the heart is due to syphilis has been disproved, as the vast majority of these cases occur as the result of previous coronary thrombosis which is very rarely found, if ever, in syphilitic aortitis alone.

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THE TREATMENT OF A CASE OF RHEUMATIC HEART DISEASE

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THE first and essential principle of treatment in rheumatic carditis is accurate diagnosis and this, although relatively simple in cases of well-established disease, may be an exceedingly complex problem in the early stages of the infection. As aptly defined by Miller¹ rheumatism in England is essentially a disease of children of the artisan class, who live in damp rooms in an industrial town, who attend an elementary school and who possibly suffer from tonsillar sepsis. Such, briefly, is the domestic and social background which must be appreciated in considering the questions of prophylaxis and appropriate treatment for the condition in all its various phases, more particularly during its early development. The latter is by common consent both variable and elusive; vague symptoms of ill-health, fatigue, loss of appetite, loss of weight, pallor, and impaired power of concentration, may persist for varying periods before their true significance is recognized, and some of the other manifestations, which as a rule admit of comparatively prompt interpretation, include recurring sore throats, intermittent pains in the muscles or joints, general nervousness, headaches, irritability and varying grades of pyrexia.

THE PERIOD OF INVASION

As a general rule the onset of rheumatic carditis is notoriously insidious, long periods of ill-defined debility usually elapsing before the diagnosis of rheumatism is well established and before the first indications of cardiac involvement appear in recognizable form. The latter is characterized by a number of clinical signs, the more important of which include dilatation of the heart, diffusion and enfeeblement of the apex beat, tachycardia, blurring of the first sound and pericardial friction. In addition the patient generally has a persistently raised temperature during the active stages of rheumatic carditis, a prolonged blood sedimentation rate and a leucocyte count

above 9,000 per c.mm.

The first essential of treatment during the febrile stage is absolute rest in a large, well-ventilated room the temperature of which is maintained at 60–62° F.; the patient should lie between blankets in a woollen suit which will need to be changed frequently if the perspiration, which incidentally must be encouraged by warm sponging at least twice a day, is a marked feature. Suitable mildly-acting antiseptic lotions, such as glycothymoline, listerine, or Condy's fluid, should be freely used with a view to maintaining an adequate hygiene of the mouth and throat during the whole course of the illness. The diet should be made up of light, digestible foods in fluid form including milk, Benger's food, vegetable soups, orange juice, lemonade, barley water, fruit jellies and the like. The patient should be given a light meal at two-hourly intervals during the day and it will usually be found necessary to introduce aperient remedies in some reliable form to obviate any tendency there may be to constipation. Salicylate medication will be indicated in all cases for, although it is generally agreed that the drug has no direct or appreciable effect in so far as the cardiac processes are concerned, the probabilities are that the heart tissues will be rendered less vulnerable if supplied with blood which has been freed from rheumatic toxins by salicylate therapy. The drug is usually prescribed with an equal quantity of sodium bicarbonate, the average doses being 30 grains four hourly for an adult and 10 grains four hourly for a child, these doses being halved after a few days if the acute symptoms subside and continued as such for a further period of two to three weeks, or possibly longer according to the progress of the disease. In a small proportion of cases there may be evidence of salicylate intolerance, the indications of such including noises in the ears and head, deafness, dimness of vision, epistaxis, and delirium. Relief from these symptoms can best be achieved by withdrawing the drug for a few days and resuming later with reduced doses or one of the alternative preparations, salicin or acetylsalicylic acid.

A number of additional remedies include those which may

be indicated on a strictly symptomatic basis and those which may be required for the relief of complications. Of the latter pericarditis is especially noteworthy. The condition is as a rule characterized by intense discomfort in the chest and persistent pain in the precordial regions. Appropriate treatment for the latter will include the application of antiphlogistine or an icebag or leeches to the precordium together with small doses of nepenthe or morphine or Dover's powder. Energetic salicylate therapy is indicated in all cases of acute rheumatic pericarditis, and tepid sponging is usually advised if the temperature rises to the region of 103° F. A troublesome and unproductive cough more often than not increases the patient's discomfort and this can best be relieved by means of a heroin or codeine linctus, suitable sedative drugs such as bromides or chloral hydrate or chloralamide being administered to ensure adequately restful nights. If there be any suspicion that fluid is collecting in the pericardial sac elimination should be encouraged by the use of diuretics and laxatives, but if, in spite of these remedies, the effusion persistently increases, it may be necessary to consider surgical interference for the relief of urgent circulatory embarrassment.

In ordinary circumstances it is fair to assume that the rheumatic infection will ultimately subside after weeks or possibly months of protracted illness. Favourable manifestations include the return of a normal temperature and pulse rate, a blood count which is within the range of health, a reasonably high level of general nutrition and relative or absolute freedom from pre-existing subjective symptoms. Such may be accepted as reliable evidence of improvement which, if well maintained for a period of three to four weeks, will justify preliminary arrangements for the convalescent period.

Convalescence.—The first obvious essential at this stage will be the introduction of such graduated movements, both passive and active, as may best be calculated to restore adequate adjustment of efficient function in the neuro-muscular and circulatory systems. Extra pillows and a suitably constructed bed rest will be required while the patient is gradually accommodated to the sitting posture. He may then be lifted on to a

couch for short periods and, after a preliminary course of light general massage, he may be allowed to take easy walking exercise daily in the bedroom and its adjoining precincts. Later, assuming gradual improvement in the exercise tolerance, and the weather being favourable, short drives and easy walks on the level may be permitted, the pace and distance being gradually increased unless there be obvious signs of circulatory incompetence, e.g. breathlessness, palpitation, giddiness or precordial distress. The importance of fresh air and sunshine cannot be over-estimated and during the whole period of convalescence the patient should be encouraged to take a generous mixed diet with vitamins in adequate proportion and suitable hæmatinic drugs should at the same time be prescribed to control any tendency there may be to anæmia.

The above scheme of treatment must in all cases be supplemented by a prolonged course of preventive supervision, for the recovery stage of rheumatic carditis is singularly uncertain and recurrences of acute rheumatism are relatively frequent, even though the quiescent stage of the disease may appear to have been firmly established. These considerations are more especially applicable to children for all the available evidence stresses the proportionately high incidence of rheumatic heart disease in early as opposed to adult life, and an elaborate memorandum³ on the subject was published by a special sub-committee of the British Medical Association under the chairmanship of Sir Humphry Rolleston. The memorandum recommended prolonged treatment extending over some months in cases of rheumatic carditis and, although it fully recognized that the only organized unit which could provide suitable facilities for the treatment of rheumatic children in every stage of the disease was a hospital, it was realized that the scope of the latter must be expanded so that the quiescent cases might be adequately supervised and that convalescent and chronic cases might be afforded the necessary facilities for prolonged treatment. It was further suggested that, in view of the shortage of beds in most of the voluntary hospitals, the after-care of children suffering from rheumatic heart affections should be carried out in special homes where they

might enjoy the advantages of modified rest in a healthy environment and educational facilities compatible with their disability. Several residential hospital schools have been provided in this country and the reports of these institutions are sufficiently encouraging to justify further expansion of the service as the available accommodation is still far short of the recognized demands.

Tonsillectomy.—Brief mention must be made regarding the value of tonsillectomy in cases of rheumatic carditis, the frequency of tonsillar disease in rheumatic children being widely accepted. In spite of conflicting opinions the general consensus of opinion nowadays is to favour operative interference if there is definite evidence of tonsillar infection and if the tonsillar glands are obviously involved; H. J. Starling⁴ advocated early operation and Poynton² regarded tonsillectomy as a “valuable prophylactic measure” in rheumatic cases. Miller¹ made an exhaustive study of rheumatism in tonsillectomized children and his final conclusions led him to believe that the operation was a harmless proceeding in that it was rarely followed by any immediate recurrence of rheumatism, and he further observed that cases of rheumatic carditis in which convalescence had been unduly protracted frequently made rapid improvement following the removal of septic tonsils. The above conclusions have been widely confirmed and, apart from the obvious advantages consequent on the removal of an infected focus, it is an acknowledged fact that rheumatic manifestations and cardiac lesions are likely to be relatively mild in tonsillectomized children.

THE COMPENSATED STAGE

The successful management of patients suffering from compensating rheumatic carditis depends in broad principle upon intelligent examination and accurate diagnosis. The physical signs afford information of the site, form and severity of the underlying lesion, the size of the heart and the condition of the circulation generally. The subjective symptoms and the patient's reaction to simple test-exercises provide additional evidence of the extent to which compensation has been

established, and in the latter respect it will be more particularly advisable to assess each case on its individual merits, for it is obvious that no hard-and-fast rules could be of practical service. Compensation implies that the heart is discharging its functions adequately, and the chief guide in promoting the maintenance of the process is the absence of symptoms in spite of the demands which convalescence and its subsequent activities may entail. The physician's first duty in all cases will be to frame plain instructions with a view to ensuring the maximum grade of efficiency of the digestive, eliminative and hæmopoietic systems, and in the latter respect to insist more particularly on the urgent need for fresh air and sunlight apart from occasional courses of suitable hæmatinic medicines. Secondly he must formulate precise directions in regard to the questions of education, occupation, exercise and hobbies; the main consideration in all circumstances being to shield the patient from circulatory strain at the same time to encourage all forms of activity as may be within his tolerance.

In the case of children it may be necessary to rearrange their system of education; valuable time has inevitably been lost owing to prolonged illness, and the child will probably be debilitated, backward and irritable. Emotional stress and intellectual strain may readily be produced in nervous children and to obviate such unfavourable influences on the compensating heart, it may at times be advisable for a child to be educated privately rather than submitting him to the discipline and minor hardships which a public school inevitably entails. The further questions of recreation and physical training will always call for special mention; many outdoor amusements will be permissible in favourable cases including walking, Swedish exercises and mild gymnastics, cycling on the level, mild horse-riding, cricket, golf and such like, but strenuous games as football, hockey, squash, tennis, hunting, polo, also cross-country runs, strenuous gymnastics, competitive sports and all tests of endurance must on general principles be avoided entirely.

The future career of boys with rheumatic carditis is a matter of considerable anxiety, and the final choice should

not be hastily made for it is impossible in the early stages to gauge the degree of compensation which will ultimately obtain and one can be by no means certain that further relapses of acute rheumatism may not complicate the issue. As a general rule all the public services are closed to boys with damaged hearts and the more arduous professions as medicine and engineering in certain of their special branches can only be recommended in a small minority of cases. Art, the church and the legal profession may be compatible with lesions of minor severity, and businesses which do not involve excessive physical or mental strain, can as a rule be chosen without risk.

In the case of an adult the questions of occupation and amusement must be revised in detail and general directions must be laid down with a view to obviating excessive exertion, mental strain and all occupations which may be conducive to physical fatigue. If the patient's lesion be severe it may be necessary that he should change his occupation for one which is less likely to overtax his diminished circulatory reserve; otherwise he should be instructed to ensure reasonable allowances of rest and relaxation also such forms of exercise as may come within the compass of his tolerance. A large number of healthy outdoor amusements are available for patients with compensated heart disease; these include walking, Swedish exercises, mild horse-riding, quiet swimming or rowing, easy cycling, skating, golf, croquet, bowls and the less strenuous forms of shooting and fishing; each or any of the above having been prescribed it will only remain for the practitioner to enlist the co-operation of the patient by impressing upon him the need for adequate caution at the same time reminding him of the subjective discomforts which he may interpret as indications of intolerance.

THE STAGE OF DECOMPENSATION

In the great majority of cases the favourable but somewhat precarious course of compensated rheumatic carditis is interrupted by varying periods of failure and the first essential in the rational treatment of such an emergency is to determine the condition or circumstances responsible for the lapse in the circulatory mechanism. Etiological indications may be identi-

fied including physical strain, anæmia, thyrotoxicosis, tobacco poisoning, the abuse of alcohol, and obesity, all of which should be capable of removal or adequate control under treatment. Otherwise decompensation may be an obviously transient event during the progress of acute infections or pregnancy. But, quite apart from these conditions and the above-mentioned causes, it frequently happens that the failure process depends entirely on the natural progress of the morbid changes in the heart itself. Assuming, however, that a definite cause or combination of causes can be determined, steps must be taken for their control or removal, and it will as a rule be equally necessary to prescribe a period of rest, either absolute or modified, according to the severity of the presenting symptoms. Efficient nursing, relaxation, a suitably chosen diet, and adequate sleep may suffice to restore the circulatory balance but a number of other remedies will be required for the less favourable cases; it may be advisable to prescribe some form of digitalis, which is indicated more particularly in cases of congestive heart failure with dilatation and auricular fibrillation, equally also in other types of decompensation in which a normal rhythm still obtains; a large number of preparations are available the more reliable including the following:—

- (1) Guy's pill which contains digitalis, blue pill and powdered squill, a grain of each, with two grains of hyoscyamus.
- (2) Tablet *Digitalis folia*, a preparation of the total glucosides of the digitalis leaf, dose $\frac{1}{2}$ to 1 grain.
- (3) The crystallized digitaline granules of Nativelle, doses $\frac{1}{600}$ grain (equivalent to 12 minims of standard tincture) and $\frac{1}{240}$ grain (equivalent to 30 minims of the standard tincture).
- (4) Digoxin, a crystallized glucoside obtained from the leaves of *Digitalis lanata*, dose 0.25 mgm.

As a general rule it will be advisable to supplement digitalis therapy by the prescription of additional diuretics, which include the mercurial compounds and various of the xanthine preparations; of the former salyrgan, novurit and neptal are especially recommended and of the latter diuretin (theobromine sodium salicylate) and euphyllin are of outstanding value. Other depletive remedies include leeching and venesection for the relief of venous congestion, acupuncture for the

direct drainage of œdema fluid, and paracentesis for those cases in which the circulatory and respiratory mechanisms are unduly embarrassed by ascites or pleural effusion. A free action of the bowels should be encouraged by the use of vegetable laxatives (cascara sagrada, senna, rhubarb, aloes), mercurial pills or salines, and in obstinate cases further remedies, e.g. glycerin suppositories, enemas or colonic lavage may need to be introduced. For the sleeplessness which is usually an unfortunate feature in cases of cardiac failure a draught of bromide and chloral hydrate (20 grains of each) is usually efficacious or alternatively chloralamide (30 grains) or paraldehyde ($\frac{1}{2}$ oz.) in orange juice or adalin (5–10 grains) or medinal (5–10 grains). If these fail an opiate in some form will be required either Dover's powder (10 grains) or nepenthe (20 minims) or heroin hydrochloride ($\frac{1}{12}$ – $\frac{1}{8}$ grain) or omnopon ($\frac{1}{8}$ grain) or morphine ($\frac{1}{8}$ – $\frac{1}{4}$ grain).

The above scheme of treatment will suffice to restore some measure of compensation in cases of average severity and, assuming that no complications arise, it will only remain to institute a carefully graduated convalescence, which should include physiotherapy (massage, hydrotherapy and remedial exercises), hæmatinic tonics, a generous diet, suitably controlled rest periods and a change to some carefully chosen place where the climate is sunny and equable.

In conclusion it should be noted that a certain number of patients suffering from chronic rheumatic carditis fail to respond to all orthodox remedies. For such, also for those suffering from frequently recurring periods of failure, thyroidectomy is nowadays regarded as a valuable remedy. The operation aims at a reduction in the metabolic needs of the body and also a slowing of the circulation rate both of which processes are of favourable consequence in that they imply reduction in the load which the failing heart is called upon to sustain.

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ON THE VALUE OF THE ELECTROCARDIOGRAM IN GENERAL PRACTICE

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THE object of this article is an attempt to answer the question—Which is the type of heart case in which helpful information from an electrocardiogram can be reasonably expected?

THE MAIN FEATURES OF THE NORMAL ELECTROCARDIOGRAM

The first part of the heart whose activity shows in the electrocardiogram (E.C.) (see Fig. 1) is the auricle; it gives rise to the small deflection called P. The string of the galvanometer then returns to the iso-electric (zero) level and after an interval of about 0.2 seconds—the time required for the excitation wave to travel from the auricles via the atrioventricular node and the bundle of His to the ventricles—the P wave is followed by the signs of the activity of the ventricle. This ventricular complex consists of the rapid initial complex Q-R-S and the slower final deflection T which are separated by the iso-electric S-T interval. Points which are important to bear in mind for comparing normal with abnormal tracings are:—Q is a small wave, frequently absent in one or several leads, Q-R-S is a rapid succession of string movements whose duration does not exceed 0.08 to 0.1 seconds in the normal case, the string returns to the iso-electric level in the S-T in-



FIG. 1.—Electrocardiogram of a normal case. In this and all subsequent illustrations the figures in the left upper corner indicate the lead—lead 1 from right arm to left arm, lead 2 from right arm to left leg, lead 3 from left arm to left leg—and the figures in the left lower corner indicate the time in fractions of a second.

terval and lastly the final deflection T is directed upwards (positive).

PATHOLOGICAL CASES

(1) *AFFECTIONS OF THE MYOCARDIUM AND CORONARY THROMBOSIS*

This is the most important group from a practical point of view because the electrocardiogram gives information about the state of the myocardium. Both rate and rhythm of the heart are normal in many cases of this group.

Affections of the myocardium.—If the myocardium is affected (e.g. cardiac fibrosis following myocarditis, coronary disease, syphilitic aortitis or aortic incompetence) the result is what is called clinically "myocardial damage." There may be signs of congestive heart failure or angina pectoris, but in many cases the symptoms and signs are strikingly few and often do not amount to more than vague precordial discomfort. The electrocardiographic signs of myocardial damage (see Fig. 2) consist chiefly in:—flattening or absence or inversion

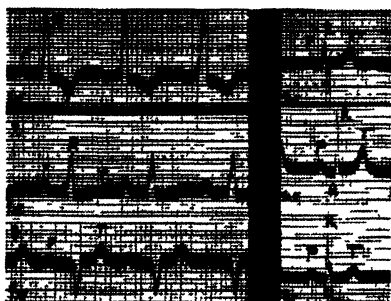


FIG. 2.—Tracing indicative of myocardial damage. From a case of heart failure occurring two years after an attack of coronary thrombosis. Note depression of the S-T interval and deeply inverted T in lead 1, depression and deformation of the S-T interval and very flat T in lead 2, high positive peaked T in lead 3; the Q-R-S complex is slurred in all leads and its duration is at the upper limit of normal (0.1 sec.). On the right of the black rectangle normal tracing for comparison.

of T in lead 1, or in lead 1 and 2, or in all three leads (a negative or absent T in lead 3 only is without such significance), in depression of the S-T interval below, or elevation above the iso-electric level, low voltage E.C. (i.e. the largest deflection in any one lead not exceeding 5 mm. with the standard technique) with slurring and notching of the ventricular complex, and bundle-branch block. Two points have to be borne in mind in this connection: first that a normal E.C. does not exclude

myocardial damage whereas the abnormalities mentioned indicate it, and second that digitalis may produce alterations in the T wave and in the S-T interval which are indistinguish-

able from those produced by myocardial damage; it must therefore be ascertained that the patient had not been given digitalis the last few days prior to the taking of the tracing.

Coronary thrombosis.—In a typical example of an attack of coronary thrombosis the diagnosis can easily be made without the help of an E.C. But there are many patients who do not present the classical symptoms or signs and particularly those in whom pain may be slight, or atypical in its localization, or absent. In these the E.C. may show changes which are almost pathognomonic and successive tracings taken after such an attack show changes in the course of the following weeks and months when compared with one another. The main changes in the E.C. (see Fig. 3) are :—Immediately after infarction

there may be a high take-off of T in lead 1, or in lead 1 and 2, sometimes in lead 2 and 3 (this varies according to the site of the infarcted area), and the S-T interval is dome-shaped,

the so-called "coronary T." In the weeks and months following the attack the point of the

take-off becomes lower and finally a sharply inverted V-shaped T wave results, the S-T interval being curved; sometimes a deep Q wave appears. The ultimate outcome is either the appearance of the signs of myocardial damage or restoration to normal; this depends of course on the degree of anatomical and functional restoration.

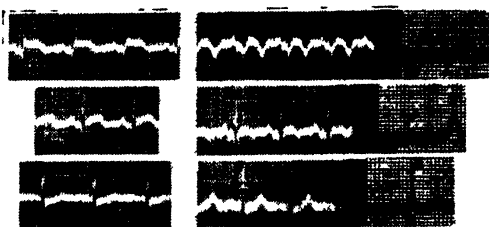


FIG. 3.—Tracing indicative of coronary occlusion. Left: after recent infarction: high take-off of T and dome-shaped R-T interval in lead 1 and 2, depression of the S-T interval and flattening of T in lead 3. Middle: the same case some time later: inversion of T in lead 1 and 2, higher positive T in lead 3. On the right of the black rectangle normal tracing for comparison.

(2) INFECTIOUS DISEASES

In this group the E.C. gives information which is particularly valuable from the point of view of prevention; the conditions which are of the greatest importance from a practical point of view are diphtheria, rheumatic endocarditis, in-

fluenza and scarlet fever. In a child suffering from mild diphtheria or mild rheumatic fever with no other signs of cardiac involvement, changes in the E.C. may occur which often disappear after a short time, but these changes are definite evidence that the heart is affected and such a finding should make prolonged rest in bed and other preventive measures imperative. The main changes in the E.C. in those cases are the result of disturbances of conduction of the impulse through the specific system of the heart due to toxic damage of conduction. The most frequent manifestations (see Fig. 4) are: lengthening of the P-R interval above the normal



FIG. 4.—Upper tracing: lengthening of the P-R interval to 0.4 sec. Bottom tracing: periodic lengthening of the P-R interval with dropped beats.

0.2 seconds to 0.3–0.4 sec. and in some cases even considerably more than this, dropped beats (the periodic or occasional failure of the ventricles to respond to the normal impulse as a result of impairment of conduction of this stimulus to the ventricles), and the various degrees of block, the ventricles responding only to a fraction of the impulses formed. It may be emphasized that in cases of lengthening of the P-R interval and in some cases of block the heart rate may be normal and the rhythm regular; in those cases the E.C. gives information which—apart from much more complicated graphic methods—no other method could give.

(3) CASES OF ABNORMALLY SLOW OR RAPID BUT REGULAR HEART ACTION

Bradycardia.—In this group a differential diagnosis of great practical importance must be made, namely whether the

case is one of sinus bradycardia or of complete heart block. In sinus bradycardia the impulse is formed at the normal place, the sino-auricular node, and it is conducted along the normal pathways, the only abnormality being an abnormally slow impulse formation. In the vast majority of cases this is a constitutional symptom in an otherwise perfectly healthy heart, mostly found in healthy young adults and not infrequently in athletes. Complete heart block on the other hand is a condition in which there is a complete interruption of the impulse conduction from the auricles to the ventricles, the ventricles following a pacemaker of their own which mostly forms impulses at the low rate of about 40 per minute. This condition is therefore indicative of an organic affection of the heart, and if the condition is progressive the occurrence of Adams-Stokes attacks is to be expected. It therefore follows that these two conditions have an entirely different clinical significance and prognosis. The differential diagnosis can in most cases be made without an E.C. An exercise test will increase the rate in a case of sinus bradycardia in the normal fashion whereas it fails to do so in a case of heart block. Moreover, as in a case of heart block the auricles follow the normal pacemaker at its normal rate and as the auricular rate can be gauged by looking at the jugular pulse, a regular jugular pulse of a normal rate of 70 to 80 per minute in the presence of a regular slow radial pulse of a rate of about 40 per minute is in favour of a diagnosis of complete heart block. It may be mentioned, however, that not infrequently cases of complete heart block are observed in which the ventricular rate is considerably higher than might be expected; it may be as high as 70.

Tachycardia.—In this group distinction must be made between sinus tachycardia in which both the site of impulse formation and the conduction of the impulse are normal, but the rate of impulse formation is higher than normal, and paroxysmal tachycardia which is a condition in which a focus situated at a place other than the normal pacemaker produces impulses of a high rate. The clinical significance

of these two conditions is entirely different. Temporary sinus tachycardia is normal as a result of physical exertion and emotional stress. Permanent sinus tachycardia may in some cases be only a constitutional symptom, but in the vast majority of cases an underlying toxic condition is present, the most important of which are hyperthyroidism and infective endocarditis ; another important cause is anæmia. On the other hand attacks of paroxysmal tachycardia as such neither indicate nor exclude any organic affection of the heart, but they should never lead to the assumption that there is any organic damage unless there are other reasons to think so. The differential diagnosis between these two forms of tachycardia can usually be made without an E.C. An attack of temporary sinus tachycardia begins and terminates gradually, whereas attacks of paroxysmal tachycardia usually start and end abruptly. Moreover in sinus tachycardia the rate is usually not more than 150 and rarely reaches 200 and there are often the variations in rate which are caused by respiration and changes in posture, whereas in paroxysmal tachycardia the rate is usually 180 or higher and the above-mentioned changes are absent. In atypical cases, however, an E.C. may be a great help.

(4) *ARRHYTHMIAS*

For an accurate analysis of an arrhythmia the E.C. is the method of choice because it nearly always enables an exact diagnosis to be made, and this often at a glance. From a practical point of view, however, there are three frequent types of arrhythmias of great importance in general practice which as a rule can easily be diagnosed without the help of an E.C. : sinus- or respiratory-arrhythmia, ventricular extrasystoles and auricular fibrillation.

Sinus- or respiratory-arrhythmia is a condition in which there is a quickening of the normal sinus-rhythm of the heart during inspiration and a slowing during expiration. Small variations of the heart rate with respiration are a feature of every normal heart, but in the adult they are usually not so marked that they would be obvious on ordinary routine examination.

They are most conspicuous in children and young adults, at the age of about 6 to 18 years. The knowledge of this arrhythmia is important because in such a case no restriction whatever of the child's activities is called for and any fear on the part of the parents that the child's heart is affected should be dispelled. This arrhythmia is naturally more marked on deep breathing and disappears when the patient holds his breath and can thus easily be diagnosed.

In a case of *ventricular extrasystoles* there is a focus situated somewhere in the ventricles forming impulses which occasionally stimulate the ventricles producing premature beats which disturb the otherwise normal sequence of beats. Those premature beats may occur only rarely, perhaps once every few hours, or they may occur frequently and if such a premature beat occurs after each normal beat the resulting condition is called coupled beats due to ventricular extrasystoles (see Fig. 5). As the next normal impulse (with rare exceptions) finds the

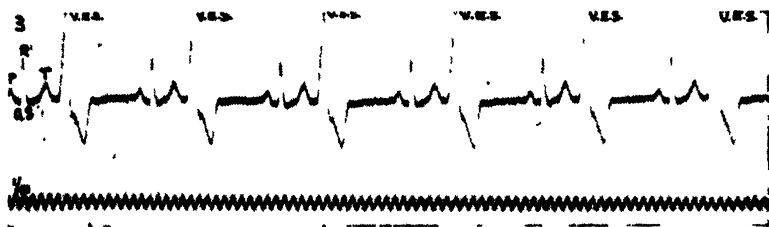


FIG. 5.—Coupled beats due to ventricular extrasystoles. The extrasystoles are marked V.E.S.

ventricles in their refractory period of the premature beat and therefore fails to yield a response ventricular extrasystoles are followed by a long pause. This sequence of events—a regular underlying basal rhythm with premature beats followed by a long pause—permits, in the majority of cases, the diagnosis to be made without the help of an E.C. They also give an E.C. of such a case its characteristic appearance (see Fig. 5). The clinical significance of ventricular extrasystoles is the same as that of paroxysmal tachycardia: their presence neither indicates nor excludes organic heart disease, but ventricular extrasystoles as such should never give rise to a diagnosis of

heart disease unless there are other reasons to think so. They are often found in heavy smokers, in nervous individuals, and as a result of a heavy meal or ærophagy. These considerations do not necessarily hold good for extrasystoles of other kinds, such as auricular extrasystoles.

Auricular fibrillation is a condition in which the auricles are stimulated at the high rate of 400 to 600 per minute; the result is that there is no longer any co-ordinated contraction of the auricles, but only an unco-ordinated fibrillation of the auricular musculature. In this condition the ventricles are stimulated only by a fraction of those abundant impulses and this stimulation takes place in a completely irregular fashion. Therefore the fundamental difference between auricular fibrillation and all kinds of extrasystolic arrhythmias is the fact that in the latter there is an underlying basal rhythm which is more or less frequently disturbed by premature beats, whereas in auricular fibrillation there is no underlying basal rhythm so that it can also be termed "absolute arrhythmia." This absolute arrhythmia together with the absence of auricular contractions which can be diagnosed by looking at the jugular veins—the jugular veins in auricular fibrillation show mainly large pulsations occurring synchronously with the contractions of the ventricles—permit in the great majority of cases the diagnosis to be made. The same factors determine also the appearance of the E.C.—absence of P waves which are replaced by frequent oscillatory movements of the string, and completely irregular succession of the ventricular complexes (see Fig. 6). The clinical significance lies in the fact that permanent auricular fibrillation is a clinical entity for which a definite kind of treatment is required, and that it hardly ever occurs in a healthy heart. The conditions which most commonly give rise to permanent auricular fibrillation are atheromatosis, particularly coronary sclerosis, hyperthyroidism, and mitral stenosis. Attacks of auricular fibrillation on the other hand are quite often found in elderly people with otherwise healthy hearts.

Whereas for the reasons given these three types of common

arrhythmias: sinus arrhythmia, ventricular extrasystoles and auricular fibrillation can in typical cases be diagnosed without the help of an E.C. this does not hold good for atypical cases. Any one of the three types of arrhythmias may occur in atypical forms and may be complicated by other concomitant abnormalities of rhythm; moreover there are a great number of arrhythmias of different types which have different clinical

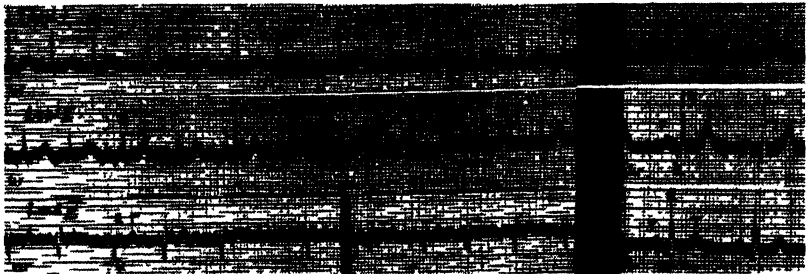


Fig. 6.—Tracing showing auricular fibrillation. Note absence of P waves which are replaced by irregular rapid oscillations, and irregular sequence of the ventricular complexes. On the right of the black rectangle normal tracing for comparison.

meanings and which may simulate one of the three arrhythmias discussed. Therefore in all cases in which there is any doubt as to the nature of the arrhythmia, or the diagnosis of the arrhythmia does not fit into the general clinical picture, or a more complicated kind of arrhythmia is suspected, an E.C. should be taken. This not only indicates the kind of arrhythmia present, but in addition is a help in diagnosis, prognosis and treatment by revealing the presence or otherwise of signs of myocardial damage.

SUMMARY

Which is the type of heart case in which an electrocardiogram may be of use?

(1) The most important group are cases in which myocardial damage is suspected, particularly if there are no other obvious certain signs. This group includes cases with vague precordial discomfort the anginal nature of which seems possible but not certain. Certain abnormal features in the electrocardiogram prove the presence of myocardial damage,

but a normal tracing does not exclude it.

(2) Here are included cases in which an attack of coronary thrombosis is suspected but the classical symptoms and signs of the attack are absent. The typical changes in the electrocardiogram make the diagnosis certain and determine the treatment, but the absence of electrocardiographic signs does not exclude an attack of coronary thrombosis.

(3) Cases of infectious diseases in which there is the possibility of an involvement of the heart; here periodic electrocardiograms may indicate that the heart is affected and thereby lead to preventive measures.

(4) Cases of bradycardia when there is any doubt as to the presence or otherwise of complete heart block.

(5) Cases of tachycardia when there is any difficulty in deciding between simple sinus tachycardia and atypical attacks of paroxysmal tachycardia. The conclusions drawn are entirely different in these two conditions.

(6) In cases of arrhythmia in the great majority of cases the diagnosis of sinus arrhythmia, ventricular extrasystoles, and auricular fibrillation can be made without an electrocardiogram. But if there is any doubt, or if the diagnosis does not satisfy when taken in conjunction with other clinical findings an electrocardiogram will indicate the kind of arrhythmia present and in addition will show the presence or otherwise of signs of myocardial damage.

(7) In cases of the more complicated types of arrhythmia the electrocardiogram is the method of choice and may even be the only method for making a diagnosis.

THE USE OF INSULIN IN NON-DIABETIC MALNUTRITION WITH SPECIAL REFERENCE TO PULMONARY TUBERCULOSIS

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THERE can be little doubt that the nutritional factor in certain diseases is of no less importance than the infective factor. This is especially so when wasting is so often a prominent feature, as in pulmonary tuberculosis, rheumatoid arthritis and thyrotoxicosis. The discovery of insulin by Banting has entirely changed the nutritional problem in the treatment of the diabetic subject. Patients, regardless of their sugar tolerance, can, as a general rule, with insulin be fully nourished. The fate of the tuberculous diabetic before the insulin era was sad, but with the introduction of a high carbohydrate diet, adequate insulin and a regime as far as possible in keeping with the sanatorium life, it has been completely revolutionized, even though the pulmonary lesion be of the active or "exudative" type. The tendency to healing and even resolution of the pulmonary lesion, as shown by serial radiographic controls, is often remarkable. Allen was among the earliest observers to note the striking contrast of results in the tuberculous diabetic before and since the insulin era.

The possibility of the tuberculous diabetic maintaining a normal blood sugar despite a liberal diet enables him to gain weight and, correspondingly, to increase his resistance to the disease. The association of good nutrition with resistance would appear to be of fundamental importance. I have, for several years, been frequently struck by the fact that adequate attention to the nutritional problem can induce definite progress towards recovery in both diseases.

A survey of the literature shows that since the discovery of insulin there have been many attempts to make use of it in

diseases other than diabetes, and much experimental work has been done to investigate the risk of hypoglycæmia in non-diabetic subjects.

Insulin was first used in disease other than diabetes by the pædiatrics. Pitfield and Marriott were among the first to treat wasting infants with it. Their results encouraged other workers, foremost among whom were Vogt, Falta and Allen, to investigate its effects in a variety of nutritional diseases marked by a lack of nutritional equilibrium.

Falta was among the earliest workers to point out that high insulin dosage in cases of non-diabetic malnutrition did not cause hypoglycæmia, provided that an adequate carbohydrate diet was given. He showed further that the periodic administration of insulin increased the function of the islets of Langerhans in the malnourished, non-diabetic subject.

Harris in 1924 suggested that insulin played an important part in the hunger-producing mechanism. His observations were based upon cases of hyperinsulinism in which the patient suffered from an insatiable hunger. It is a physiological fact that hunger is accompanied by increased gastric motility. Quigley, Johnson and Solomon have shown that insulin has a marked effect on the motor-activity of the stomach and that it can increase both the tone and the duration of this activity. R. D. Lawrence believes that the stimulation of appetite by mild hypoglycæmia is the essence of the action of insulin and that a sufficient dose is necessary to induce such hypoglycæmia.

Many observers have referred to the increase of gastric and pancreatic secretions associated with hypoglycæmia following the use of insulin and they attribute gains in weight to this improved secretion. Others have noticed how insulin has a favourable effect on general food metabolism, on the motility of the gastro-intestinal tract and on its secretions. My experience of its use in non-diabetic malnutrition has led me to believe that it is an important therapeutic agent in selected cases and that it probably influences the utilization of most foodstuffs. On the other hand, the possibility of its misuse must always be borne in mind, and a diagnosis of the cause of the malnutrition must of necessity precede any application of insulin.

THE USE OF INSULIN IN PULMONARY TUBERCULOSIS
There is a somewhat extensive literature on the use of insulin in pulmonary tuberculosis, coming mainly from Continental and American workers. In this country, however, its use in this disease has been somewhat neglected. Yet there is no doubt that it can be employed with great success in the treatment of certain undernourished tuberculous subjects, as my

experience of it during the last ten years has amply shown.

Despite all the recent advances in the treatment of pulmonary tuberculosis—and they will compare favourably with any other branch of medicine—it has to be admitted that these are concerned almost exclusively with methods for promoting rest and for immobilizing the local inflammatory lesion. Now in all infective or bacterial diseases the general constitutional aspect is just as important as the local lesion, but there is a tendency, in view of the important developments in thoracic surgery, to neglect this general aspect. The eminent thoracic surgeon, Professor Sauerbruch, has only recently emphasized afresh how important it is to recognize the general aspects of this disease.

Few will question that a phthisical subject is best treated at an institution, run on rigid sanatorium lines, where rest and graduated exercises, with general routine and strict medical and nursing supervision under the best possible conditions, can be obtained. Not one of the many special treatments can possibly replace the strict sanatorium regime—they are merely adjuncts to it.

There are three primary objects of sanatorium treatment, namely :—(1) To raise the patient to his highest known weight. (2) To raise the patient's resistance and standard of physical fitness to that degree which will enable him to do the maximum amount of work without producing any constitutional disturbance. (3) To stop the discharge of sputum. Every available method should be utilized to fulfil these three objects. The first and second may be regarded as an index of the general constitutional aspect of pulmonary tuberculosis.

The problem of anorexia, with or without dyspepsia; and with loss of or failure to gain weight, in certain cases of pulmonary tuberculosis, is one which most clinicians will admit to be beset with difficulties and disappointments, in spite of the use of every known form of drug treatment to stimulate the appetite. It is in such obstinate cases, in which the lesion shows no gross evidence of activity, that insulin can be employed with the greatest success.

I have observed, among sanatorium and other patients,

that the administration of insulin has frequently been responsible for maintaining the quiescence of a lesion. There is no doubt that had it not been employed in certain cases, the continued loss of weight and resistance would have been responsible for reactivating the pulmonary disease. The drug can be used in any selected case of pulmonary tuberculosis, provided that the indication and contra-indications are carefully observed, and I have given it with success to patients in sanatorium, dispensary, out-patients, hospital and in private practice, and as a supplement to collapse therapy. Insulin will often combat anorexia when every other measure has failed and will prove to be a valuable therapeutic measure. If it is correctly administered patients will frequently begin to eat with real appetite and gusto. Many, moreover, in addition to an improved appetite, gain in weight and strength. The tonic effect of insulin is, at times, quite remarkable.

Resistant cases.—A small proportion of cases have proved resistant to the effects of the drug and have shown no appreciable response, but no explanation of this has as yet been given. In the majority of instances, however, if there has been no gain in weight, there has certainly been a gain in strength. Frequently there is reduction of symptoms and signs, and of the extent of infiltration of the lung parenchyma seen on serial skiagrams, indicating thereby appreciable healing and even resolution.

Indications.—It must be emphasized at the outset that insulin is not to be regarded as a cure for pulmonary tuberculosis. Its indiscriminate use is fraught with danger and, as with so many other valuable therapeutic measures (e.g. artificial pneumothorax), inevitably brings it into disrepute. There are some who claim that insulin can be used in *all* cases of pulmonary tuberculosis. My own experience has failed to show any appreciable results in advanced active disease, although good results have been claimed in such cases. In the utilization of insulin in pulmonary tuberculosis my own procedure has been a much more restricted one. A patient whose appetite is poor, who fails to put on weight, who is afebrile, whose disease shows no gross evidence of activity and with

whom the usual medicinal measures have failed to correct these symptoms, is eminently suitable for insulin therapy. All cases should, wherever possible, have clinical, radiological, hæmatological and bacteriological controls, and regular observations of weight, pulse, temperature and blood pressure should be made during the course of the treatment.

Contra-indications.—I have avoided using insulin in the following circumstances :—

- (1) When there is fever.
- (2) When there is active pulmonary disease, including any complications such as laryngeal tuberculosis with dysphagia or active intestinal tuberculosis.
- (3) When there is hæmoptysis.
- (4) When there is marked hypotension.
- (5) When severe reaction follow the injections.

DOSAGE AND TECHNIQUE OF TREATMENT

It has been my practice to begin the course of treatment with a hypodermic injection of 5 units of insulin.* This is given twenty minutes before the principal meal and is followed three hours later by a glass of milk or a tablespoonful of glucose to avoid any risk of hypoglycæmia. Patients are advised, as in the case of diabetes, to carry two or three lumps of sugar with them and, should they develop any symptoms of hypoglycæmia, such as general weakness, listlessness, shakiness, palpitation, giddiness and sweating, to take a lump of sugar immediately. The injection of 5 units is continued daily for the first week. This dose is increased by 5 units weekly, so that :—

In the second week 10 units daily are given.

In the third week 15 units daily are given.

In the fourth week 20 units daily are given (10 before lunch and 10 before dinner).

In the fifth week 25 units daily are given (15 before lunch and 10 before dinner).

In the sixth week 30 units daily are given (15 before lunch and 15 before dinner).

Milk or glucose follows three hours after lunch or dinner;

* R. D. Lawrence, in a personal communication, doubts whether anything under 10 units of insulin induces the mild hypoglycæmia necessary to stimulate the appetite. This dose is, however, quickly reached.

30 units per day has been the maximum dose I have used, although American and Continental clinicians have used larger doses over longer periods. Formerly, I repeated the maximum daily dose for two or three weeks, but now I frequently do so for four or more weeks.

The course of insulin treatment is one of two to three months' duration. It can, naturally, be repeated at intervals and I have sometimes given two or three courses, although in many cases the effects of insulin have been maintained after the first course has been discontinued. As with diabetics, if the patient is not in an institution he can readily be taught to give the injections himself into the skin of the thigh or abdomen. This he can very quickly master, particularly with the "Patients' Insulin Outfit," as supplied by Messrs. Bencard or Burroughs Wellcome, whose preparations of insulin I have used with satisfaction. For the larger doses, double strength insulin (i.e. 40 units per c.cm.) makes the quantity injected a smaller one and therefore adds to the patient's comfort.

For several years I have been using insulin with increasing frequency and, subject to the indications, contra-indications, dosage and duration of treatment outlined above, I cannot recall any outstanding incidents or complications arising from its use.

ILLUSTRATIVE CASES

I have already shown cases to the Clinical Section of the Royal Society of Medicine, illustrating the value of insulin therapy in pulmonary tuberculosis with or without collapse therapy. The following cases are among many which have been treated on these lines:—

Case I.—G. V. M., typist, aged 21, was a definite case of pulmonary tuberculosis, first seen in June, 1933. Her temperature range was 98·6 to 99·8 F., pulse 94 to 100, sputum 2 drachms in twenty-four hours, positive for tubercle bacilli; weight, 8 st. 11 lb. 10 oz. Evidence infiltration of upper and middle zones of both lungs was present. There was no definite evidence of excavation. She was given a course of 5 grammes of sanocrysin. She was discharged from sanatorium in June, 1934. Her sputum was scanty, positive for tubercle bacilli; weight was 8 st. 10 lb.; she was afebrile. Despite nearly one year of treatment the patient made only fair progress and showed little resistance to tuberculosis. Clinical and radiological findings remained stationary, no adventitious sounds were heard and there was no gross evidence of activity. Although the sputum was much reduced in quantity, it still contained tubercle

bacilli in small numbers. The physical signs remained stationary during the next twelve months. Only a trace of sputum was being expectorated in twenty-four hours and no tubercle bacilli could be found. Appetite was only fair and she had lost a few pounds in weight.

In November, 1935, she consulted me because of anorexia, progressive loss of weight, persistent dyspepsia, flatulence and fullness after food, and marked lassitude. It was then decided to put her on a course of insulin. Observations of her weight, temperature and pulse were kept, and clinical and X-ray examinations were made, the latter showing scattered infiltration in the upper and middle zones of both lungs. After the first three weeks of insulin therapy she began to enjoy her food, lost all symptoms of dyspepsia, felt stronger and, at the end of a three months' course, she had gained 10½ lb. in weight, had no cough and only a trace of sputum, which was free from tubercle bacilli. She was afebrile with a normal pulse rate and had no active physical signs in the chest. X-ray examination showed evidence of infiltration with fibrosis and definite evidence of healing. The progress has been well maintained up to the present time.

Case II. Insulin and artificial pneumothorax.—A. V. A. was a dentist's receptionist, aged 20. She was first seen in July 19, 1934. She had pulmonary tuberculosis (exudative lesion) involving the upper and middle zones of left lung, with 1 drachm of sputum daily containing tubercle bacilli. She had immediate sanatorium treatment and, after one month, a left-sided artificial pneumothorax was induced. Her weight was then 7 st. 1 lb.; she had neither cough nor sputum, was afebrile and symptomless. After six months of institutional treatment she was discharged to her own home. Artificial pneumothorax refills have been continued at regular intervals. Her general condition has remained fair throughout, although she has not gained any weight, and her appetite has always been a small one. At Christmas, 1935, however, she complained of anorexia, indigestion with her meals and lack of energy. Her weight had gone down to 6 st. 9 lb. The left lung was well collapsed, there was no evidence of disease either clinically or radiologically in the right lung, and I decided to put her on a course of insulin. For the first two weeks no appreciable effect was observed, but towards the end of the third week (with 15 units of insulin) she first experienced a real desire for food and her dyspeptic symptoms, although still present, were much less marked. At the end of one month's treatment, despite mild febrile episodes, her appetite continued to improve and, towards the end of the ninth week, she had gained 11½ lb. in weight. She described her appetite as enormous. The course of insulin was continued for three months. On March 20, 1936, she weighed 7 st. 7 lb. She felt thoroughly fit and well and was entirely free from symptoms. Despite the cessation of insulin she maintained her general feeling of well-being and her good appetite continued although she did not gain much weight. On May 15, 1936, her weight was 7 st. 10 lb., and this has remained more or less stationary ever since. The artificial pneumothorax refills were continued during the course of insulin treatment.

Case III.—A. J. D., a solicitor's clerk, aged 27, was found, in November, 1930, to be suffering from advanced unilateral pulmonary tuberculosis, involving the upper and middle zones of the right lung, with cavitation in the right upper zone. He was then acutely ill, febrile and markedly wasted and toxic. The sputum contained tubercle bacilli in large numbers and the pulmonary lesion was complicated by tuberculous enteritis. The patient became steadily weaker and so, despite the enteritis, an artificial pneumothorax was attempted early in 1931. A fairly satisfactory degree

of collapse was obtained and refills were continued in combination with sanatorium treatment. Nevertheless, wasting, general malaise and symptoms of the enteritis continued; adhesions and a serous effusion complicated the pneumothorax and the patient was confined to bed during some twelve months in a sanatorium. In April, 1932, the patient, obviously going downhill and complaining of increasing weakness, asked for his discharge, against medical advice, and returned home by ambulance. Refills were discontinued and he was put on absolute rest for one month. His general condition improved somewhat and the diarrhoea ceased. He was afebrile while confined to bed but continued to complain of profound weakness and anorexia. Physical signs were confined to the right lung. There was evidence of some degree of collapse with effusion at the base. An X-ray examination in June, 1932, showed the heart and mediastinum displaced to the right. There was a good collapse at the base, but the upper zone showed evidence of an uncollapsed cavity and adhesions. The necessity of an improved state of nutrition with an increased resistance, to permit of a more complete collapse, had to be considered.

The appetite induced by insulin in otherwise intractable cases of anorexia has, in certain selected cases, proved so striking that an attempt was made in this case to combat the anorexia with it and to improve the general condition of the patient. Immediately after the insulin the patient began to eat with a real appetite and he developed an almost insatiable hunger. His weight on September 14, 1932, when insulin was begun, was 7 st. 6 lb., and on November 4, 1932, he weighed 8 st. 2 lb., steadily gaining weight each week.

Case IV. Insulin in conjunction with thoracoplasty and pneumothorax.—E. B., female, aged 40, gave a history of pneumonia and left-sided pleurisy in 1920. First definite symptoms of present illness in April, 1932, consisted of cough with blood-stained expectoration, loss of weight and slumber sweats. Tubercle bacilli were present in large numbers in the sputum. Definite active tuberculous infiltration involving upper and middle zones of left lung and middle zone of right lung. Institutional treatment at a sanatorium for four months. She left with an artificial pneumothorax which was kept up for two years and then had to be discontinued. April, 1934: left phrenic evulsion, followed by a course of sanocrysin in July, 1934.

I first saw her in October, 1934, when she complained of a cough with abundant sputum (4 to 6 oz. in twenty-four hours), containing tubercle bacilli in large numbers. She weighed at that time 6 st. 2 lb., her highest known weight being 7 st. 13 lb. Her general condition was extremely poor and she said she felt no better for the various treatments she had undergone. She had what might be called a left fibrothorax with a very extensive cavitation, the mediastinal contents being well displaced to the left side. The right lung was comparatively clear. I came to the conclusion that the condition of the left lung, with the expectoration of so much tuberculous sputum, was a real danger to the integrity of the right one, and that a permanent collapse of the left lung was necessary. In consultation with the late Mr. H. P. Nelson, a left thoracoplasty was decided upon and the patient agreed to have this done when the weather conditions were better. Mr. Nelson performed a complete left-side thoracoplasty in three stages, in April, 1935, but by that time the patient had developed a recent spread at the right apex, with three small cavities, each 1 cm. in diameter. A small selective collapse to get the right apical lesion under control was, therefore, induced as a preliminary measure, following which the cavities

were no longer visible in the skiagrams. Although the patient did not stand the operation very well and required a blood transfusion on account of marked anæmia, she made some progress following institution treatment at Frimley.

When I saw her again in February, 1936, her weight had not improved (6 st. 2 lb.). She had, however, no cough or sputum, so that the operation had reduced 6 oz. of sputum containing tubercle bacilli to nil—a very considerable achievement. Her general condition, however, left much to be desired and, despite many attempts to improve it by medicinal measures, she had no appetite. In view of the fact that surgical measures had rendered the disease inactive and that the lack of appetite persisted, I decided to start her on a course of insulin. This was begun on January 3, 1936, commencing with 5 units daily for the first week and increasing the dose by 5 units each week until 30 units daily were being given. This was repeated for three weeks. The patient soon began to eat with a genuine appetite; her nutritional state, and thereby her resistance also, were considerably improved and she quickly began to put on weight and to feel stronger. By the time she had completed the course she had gained 12 lb. in weight. It is now proposed to begin a second course of insulin.

While the main part of this article is confined to the use of insulin in pulmonary tuberculosis, its use in two other conditions in which wasting is often a prominent feature has been so beneficial as to merit brief attention.

THE USE OF INSULIN IN RHEUMATOID ARTHRITIS

At the St. John Clinic and Institute of Physical Medicine and at the Rheumatic Unit at St. Stephen's Hospital many cases of rheumatoid arthritis with muscular wasting have come under my care. As I have pointed out elsewhere there is a very close analogy between this disease and pulmonary tuberculosis. Both are infective diseases in which a consideration of the general constitutional aspect is of fundamental importance. The local manifestation in the one case is in the lungs and in the other it is in the joints. Numerous cases of rheumatoid arthritis which have come under my care could be reviewed, showing how improvement of weight, appetite and resistance has had a favourable effect on the reduction of pain and swelling of involved joints and improved mobility and function. The course of treatment and dosage of insulin are precisely the same as for pulmonary tuberculosis.

INSULIN IN THYROTOXICOSIS

It is my usual practice in cases of thyrotoxicosis to advise a thyroidectomy as early as possible. There are cases, however, where any question of an operation is flatly refused. My

experience of several thyrotoxic subjects who have been markedly malnourished has been that with insulin the nutritional state has undergone so obvious an improvement as to effect an appreciable change on the whole clinical condition. In some cases the resulting gain in weight and resistance have rendered the patient better fitted to undergo a thyroidectomy and, moreover, this improved general condition can so change the mental outlook that the one-time stubborn patient will subsequently agree to undergo an operation.

Z. G., a milliner, aged 28, complained of palpitation, loss of weight, breathlessness, nervousness and trembling for twelve months. She was first seen on June 27, 1935. Weight at that time 6 st. 10 lb., highest known weight 8 st. There was no exophthalmos or other eye sign. Definite diffuse enlargement of both lobes of the thyroid was present with marked venous pulsation in the neck, pulse rate 160, heart markedly overacting, no enlargement, a slapping first sound, short systolic murmur at the apex, and blood pressure 155/60, showing the characteristic high pulse pressure.

X-ray examination of the heart showed no enlargement but prominence of the pulmonary conus. Electrocardiograph showed simple tachycardia. The patient refused thyroidectomy and she was treated as an in-patient with complete rest in bed and was given insulin as prescribed above for three months. She developed an enormous appetite following insulin, with corresponding increase in weight and improvement of general condition. When discharged from hospital in November, 1935, she weighed 8 st. 4½ lb. Blood pressure was 130/70, heart-rate 84, free from symptoms. She has been seen monthly since then, and was last seen in November, 1936. Her weight was well maintained, being 8 st. 8½ lb., her heart rate 80, and blood pressure 120/70. She was free from symptoms.

CONCLUSIONS

(1) A brief review of the literature indicating the use of insulin in non-diabetic malnutrition is given.

(2) Reference is made to the suggested increase in gastric and pancreatic secretions with a mild hypoglycæmia, following the use of insulin, to its favourable effect on general metabolism and on the gastro-intestinal tract and its secretions.

(3) The value of insulin as a therapeutic measure in certain selected cases of phthisis in restoring normal appetite, digestion and in combating loss of weight and resistance, is outlined.

(4) Insulin is not to be regarded as a cure for tuberculosis and its systematic use in all cases is to be discouraged, but it should be generally recognized as an important therapeutic measure.

(5) Its use in pulmonary tuberculosis in conjunction with specialized methods of treatment, such as artificial pneumothorax and thoracoplasty, is illustrated.

(6) The dosage, course of treatment, indication and contra-indications, as experienced by the writer, are outlined.

(7) The use of insulin in other cases of non-diabetic malnutrition, such as rheumatoid arthritis and thyrotoxicosis, is briefly noted.

(8) A warning against the abuse of the drug is given and its use in any case of malnutrition should never be considered until an accurate diagnosis of the cause of the malnutrition is made.

(9) While the majority of cases, if properly selected, will show a response to insulin therapy, either by a gain of weight and strength or both, cases resistant to insulin therapy are sometimes encountered and for these no real explanation can be given.

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THE TREATMENT OF GONORRHŒA AND ITS COMPLICATIONS

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THE *diagnosis* of acute gonorrhœa is usually clinical and and is established by the pathologist's finding the intracellular Gram-negative diplococcus in the purulent urethral discharge. As a rule the gonococci are found only in the first few weeks of the infection. They are not easy to culture. Like the spirochæte they quickly die from chilling or drying, and extra-genital infection is uncommon. Complete abortion of an acute attack is rare. Prophylactic treatment is effective up to about twelve hours after infection, after this the organism has penetrated the surface epithelium of the urethra.

Prophylactic treatment is carried out by washing the genitals thoroughly with soap and water, and liberally smearing them with calomel cream. The anterior urethra is freely irrigated with 1 in 15,000 potassium permanganate (not stronger), and a urethral instillation of 1 ounce of 10 per cent. argyrol in glycerin is made and retained for five minutes. The patient is examined frequently during the following two or three weeks.

THE TREATMENT OF GONORRHŒA

(1) *Injections*.—Two intramuscular injections of 1 c.cm. of manganese butyrate are given at a week's interval, followed a week later by contramine 0·25 gm. intramuscularly.

(2) *Diet*.—Coffee and all forms of alcohol are forbidden. A quiet life is advised, with ten hours in bed each night. Sexual intercourse and kissing are contra-indicated. Mental and physical fatigue are avoided.

(3) *The bladder and urethra*.—The treatment assumes that the infection affects the entire urethra, although at first the anterior part is mainly concerned. The bladder and the urethra are irrigated daily, not oftener, with 2 pints of potassium permanganate. Patients in their anxiety to recover tend to overdo their treatment unless previously cautioned. The strength of the lotion is 1 in 15,000 at the beginning, and is

gradually stepped up to 1 in 10,000, which is the strongest concentration advisable; often 1 in 8,000 or even 1 in 5,000 are ordered; these are irritating, not helpful, and occasionally harmful by superimposing a chemical urethritis. Potassium permanganate exerts a valuable stimulating effect on the urethral epithelium and on sub-epithelial unstriated muscle.

PROGRESS

As the purulent discharge lessens the washout is slowly strengthened, and when the first glass of a specimen of urine, which has been retained for four hours, contains no macroscopic pus, oxycyanide of mercury, beginning with 1 in 15,000 and increasing to 1 in 10,000 is used for the irrigation. The lavage can be carried out at home, using a rubber irrigating apparatus or a Higginson's syringe (cost—a few shillings), and is especially useful to patients—e.g. a traveller—whose work requires moving frequently from place to place. The irrigations are reduced slowly to thrice, twice and once a week. Occasional courses of lavage by 12 per cent. sodium sulphate are useful; the length of the flakes following its use indicates its power to attract secretion from the deeper parts of the prostate.

URETHRAL INSTRUMENTATION

When the macroscopic pus has been disappeared for three to four weeks, instrumentation by sounds, bougies and Kohlmann dilators (Fig. 1 and 2) is made to stimulate the con-



FIG. 1.—The Lister-Benique bougie.

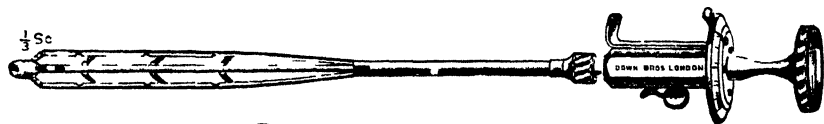


FIG. 2.—The straight Kohlmann.

tracted and thickened urethra to return to its normal calibre, and to avoid stricture formation. Further, blocked and enlarged submucous follicles containing residual infection are ruptured by the stretching of the Kohlmann dilator or by

massaging the urethra digitally on a sound. It is performed once a week, for a period of not longer than six weeks. The vesiculæ seminales and prostate are then massaged once a week for four to six weeks. At least a month must elapse before starting a further course of instrumentation or prostatic massages and both are stopped if the urethral discharge or macroscopic pus in the urine reappear. They are cautiously resumed when they have been subsided for 2-4 weeks.

TESTS FOR CURE

When the following conditions are satisfied, tests for cures are made : (1) The early morning, or at least a four-hour specimen of urine passed into a first and second glass must be clear of macroscopic pus and flakes. (2) Treatment by urethral irrigation, instrumentation and prostatic massage has been given.

The test consists of a microscopic examination of the centrifuged deposit of two specimens of urine. The first is collected in the early morning on waking, and the other immediately after a prostatic massage. If no pus cells are present in either, all treatment is discontinued for a month, but if pus is present, a fortnight's holiday is taken, and then the second course starts. An instrument is passed once a week for two weeks, and prostatic massage weekly for a month, then the test is repeated. If the urine is clear again, a further rest of six weeks is taken, and the patient is allowed moderate amounts of alcohol, which will provoke a reaction if infection remains. If pus cells are found the interval is one month, and alcohol is not allowed. A final course consisting of an instrument for two weeks and a prostatic massage for four weeks is performed. Bladder wash-outs twice or once a week are resumed. The last test is made on three specimens of urine, i.e. early morning, daytime after four hours retention, and after a prostatic massage. When three consecutive negative tests have been reported the patient is urethroscoped, and if nothing abnormal is detected cure is pronounced. When pus cells are present the urethral instrumentation, followed by prostatic and vesicular massage, a month on each, continues interrupted by gradually increasing holidays. Special attention is always paid to the general health, exercise, rest and tonics, including cod-liver oil and

malt, or Scott's emulsion.

The relief of gonorrhœa is seldom so uneventful and progressive as here described. The quickest cure I have seen on these lines is six months ; it is frequently a year, and often two or even three. Ten or even twenty tests may have to be made before three are consecutively free from pus cells.

What reply should be given to the important question asked so anxiously by patients. "How soon can you cure me?" The answer depends on how soon after the onset of the infection the patient reports for treatment, also on how faithfully and regularly the treatment is carried out. The safe minimum is about six months, twelve months is the average, and three to four years is not uncommon. Every complication extends the period. It is a regrettable fact that not more than 10 per cent. of hospital patients with gonorrhœa complete treatment to the standard of cure here described.

Syphilis.—All patients suffering from gonorrhœa are tested for syphilis, i.e. the Wassermann or Kahn test is determined. The primary chancre is occasionally overlooked or inconspicuous. When a positive reaction is found the treatment of syphilis runs concurrently with that of the gonorrhœa. An appreciable percentage suffer from both infections.

THE COMPLICATIONS OF GONORRHOEA

Epididymitis.—Epididymitis is usually unilateral, and it may be the first symptom of gonorrhœa to intrude itself to the patient's notice. Thus it is necessary to exclude the diplococcal organism in all cases of apparently spontaneous epididymitis. Examination of the centrifuged deposit of urine taken before and after a prostatic massage will quickly settle this delicate point. On rare occasions patients with a primary infection by the *Bacillus coli* or the tubercle bacillus are met. Epididymitis is treated by rest in bed during the acutely painful stage. Contramine, 0·25 gm., is injected every third or fourth day. A gallon of fluid is taken daily, consisting of all beverages except coffee and alcohol. Glycerin and belladonna or antiphlogistine compresses are applied to the scrotum four-hourly until the pain subsides, when dressings liberally plastered with guaiacol ointment, 5 to 10 per cent., are instituted.

A large suspensory bandage (the size of a foetal head) retains the dressings. Warm baths are taken morning and evening when the pain and pyrexia are settling. Diuretics keep the urine alkaline, potassium bicarbonate is less nauseating than the customary potassium citrate. Urethral irrigations, instrumentation and prostatic massages are discontinued until the attack has disappeared for two weeks. Suppuration is unusual, it is treated by aspiration; rarely is incision necessary.

Phimosis, paraphimosis and balanitis.—These complications may be discussed together. They can often be avoided by careful hygiene, but occasionally a dorsal slit of the prepuce or circumcision is advisable (Fig. 3). The operation can be performed under a local anæsthetic (novocaine $\frac{1}{2}$ per cent.) which is injected about the root of the penis—i.e. well removed from the septic area. A tourniquet (a No. 6 catheter) is tied round the base of the penis to render the process bloodless; in adults the blood vessels are easily visible, clipped and tied off. The dressing, preferably a greasy one—e.g. 1 in 1,000 acriflavine emulsion, vaseline or calamine liniment—is tied to the raw edges of the skin by the actual catgut sutures (Fig. 4). The

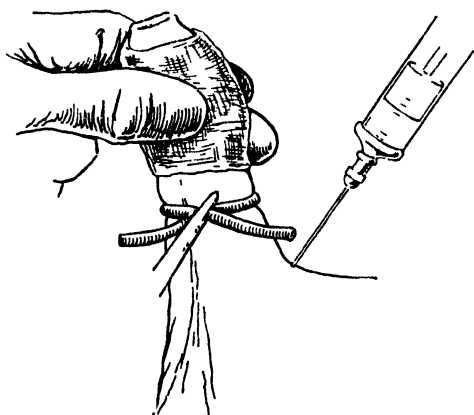


FIG. 3.—Circumcision, showing : (a) the injection of local anæsthetic around the base of the penis ; (b) the application of a tourniquet—a No. 6 catheter.

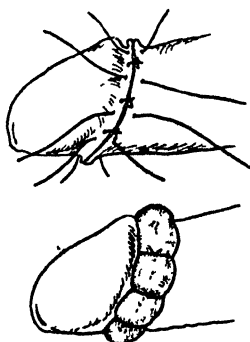


FIG. 4.—Shows the prepuce removed, the stitches inserted and tied over a sterile greasy dressing (vaseline or acriflavine emulsion), thus protecting the wound edges.

patient is not incapacitated and continues to work. No after-treatment is required until the sutures are removed a week later. A pre-anæsthetic of nembutal or omnopon and scopolamine is given. The time-proved remedy of bromide and nuxvomica controls erections until healing is complete. In all

cases of sepsis about the prepuce including non-venereal patients, the urine is examined for sugar, for a proportion are undetected diabetics.

Recurrence of the urethral discharge.—A further complication of gonorrhœa is recurrence of the urethral discharge. It may appear during the course of an apparently progressing treatment. It is usually explained by one or more of the following : (1) Sexual intercourse, or the excitements of flirting, dancing or masturbation. (2) Indulgence in alcohol, even in small amounts, sometimes after coffee. (3) Colds, influenza, exposure or excessive physical exertion and worry.

Causes (1) and (2) explain most cases, and married men find the first difficult to avoid. The treatment of gonorrhœa calls for considerable restraint by the patient, assisted by encouragement and assurances from the surgeon.

Warts and condylomas.—These appear in large numbers on the glans penis, prepuce, labia minora, and around the anus, especially when the hygiene is indifferent. Daily washing of the genitals and anus with soap and water assists in its prevention. The warts are touched with the thermo-cautery, preceded by an injection of $\frac{1}{2}$ per cent. novocaine, around the base. Thereafter they are dabbed with pure Milton morning and evening. Several sittings may be necessary to clear them entirely.

Prostatic abscess.—Gonorrhœa treated on the lines indicated here rarely develops a prostatic abscess. It is one of the complications one's "important" patients develop. Rest in bed in hospital or in a nursing home is necessary. Frequent sitz baths, heat to the pubes and perineum, hot rectal washouts, and copious drinks are given. The abscess usually discharges into the urethra, but occasionally an incision anterior to the rectum is necessary for drainage. Incision through the rectum is inadvisable, but it may point and rupture in this direction.

Retention of urine.—Retention of urine occurs both early and late in the course of gonorrhœa. In the acute stage it is due to intense inflammatory congestion and swelling at the internal meatus, including the prostate and spasm of compressor urethræ. In the chronic stages, stricture of the urethra supervenes. In outlining its management, the remarks apply equally

well to retention caused by the enlarged prostate. The important point in handling a patient with retention is to realize that there is no immediate indication for instrumentation, which is attempted only when the patient is in bed or in an operation theatre, and the necessary equipment is assembled. It is unwise to perform it in the consulting room or in a casualty department. Morphine $\frac{1}{8}$ grain is given, and the patient is sent home, to a nursing institution, or to hospital, where the treatment is carried out. Urethral dilatation is a shocking procedure, and to permit a patient to go home shortly after it risks collapse in the street, an attack of hæmaturia, severe acute cystitis, or uræmia ; sudden death has occurred, although, admittedly, it is rare.

Three years ago I saw a patient die twenty-four hours after catheterization—he had an enlarged prostate and cystitis; death was explained by fulminating septicæmia. Another old gentleman, after the passage of a bougie in his surgeon's consulting room, had profuse hæmaturia on his way home ; he collapsed and died of uræmia within a week.

Research work has shown that organisms placed in the anterior urethra of a rabbit can be isolated from the lymphatics of the pelvis of the kidney in twenty minutes. Similarly, *Bacillus coli* have been grown from the blood stream twenty minutes after passing a catheter. The old-fashioned "catheter fever" is thus explained : it was a transient septicæmia, and it emphasizes the importance of scrupulous asepsis in catheterization.

The first step to relieve retention of urine is to put the patient in a warm bath, and to keep a tap running. Give him a cigarette, and a paper to read, instructing him to micturate into the water if possible. The morphine ($\frac{1}{8}$ grain) will dull his anxiety (not a larger amount because he may go to sleep in the bath). The method is often effective in partially emptying the bladder.

If the bath is unsuccessful *instrumentation* is attempted. I advise the use of a large silver catheter, then soft rubber, and gum-elastic last, adding the reminder that if the patient has an enlarged prostate a prostatic catheter is required ; for the ordinary catheter will not reach into the bladder. A urethral anæsthetic is given: a satisfactory one is made by mixing equal parts of 1 per cent. sodium bicarbonate and 1 per cent. solu-

tion of cocaine hydrochloride; 2 ounces are introduced into the urethra and retained by a penile clamp or a catheter tied round the penis (Fig. 5). Five minutes, but preferably twenty, are allowed while it takes effect, when 1 ounce of warm liquid paraffin is injected into the urethra; good lubrication is essential in urological surgery; vaseline and glycerin are useless in this respect; K.Y.



FIG. 5.—The Thomson-Walker penile clamp.

jelly is probably the best. The patient's buttocks are elevated on a firm pillow; this is an important step, for it prevents the patient "running away" from the instrument. The largest size catheter or bougie is tried first. Much cunning and patience, but no force, is the secret of a successful negotiation of a tortuous urethra. If difficulty is encountered try inserting the catheter with the left and right hands from either side of the table. If the bladder is entered, 20 ounces is slowly withdrawn. The catheter is taken out, and reinserted four-hourly when 15 ounces are drained, and so on until the bladder is empty. An alternative is to tie the catheter in the urethra and to stop it with a spigot; this avoids the discomfort and difficulties of re-insertion, but risks an acute urethritis. The penis and tube are dressed with gauze moistened with glycerin and boracic lotion.

If the instrumentation fails, 20 ounces of urine is extracted from the bladder by a supra-pubic puncture made with a fine lumbar puncture needle (no. 19 or 20), and further treatment is deferred for several hours. Morphine $\frac{1}{6}$ to $\frac{1}{4}$ grain, with coramine 1 c.cm. is given, and as a rule the patient will sleep. Gradual decompression of the bladder is essential, immediate emptying of the bladder may be followed by anuria or profuse hæmaturia, which may end fatally. Later gradual dilatation or urethrotomy (internal or external) is required for a stricture, and supra-pubic cystostomy for an impassable stricture.

Stricture of the urethra.—Urethral stricture is a late complication of gonorrhœa; it occurs in one or more of three areas of the urethra:—(1) At or near the external meatus; (2) at the junction of the penile and spongy urethra; (3) at the point where the urethra turns upwards through the triangular

ligament towards the bladder.

A stricture is treated by systematic dilatation with Lister, Benique or Lister-Benique bougies, and Kohlmann's dilators until the normal size is attained (fig. 1 and 2). When this standard is achieved, instruments are passed at gradually lengthening intervals up to a year, when, for the rest of the patient's life an annual prophylactic dilatation is advisable.

The complications of a neglected stricture are numerous. They usually arise when the patient is about fifty, and are not infrequently mistaken as due to an enlarged prostate. They are worthy of mention.

(1) In the urethra—peri-urethral abscess, calculus, extravasation of urine.

(2) Chronic prostatitis with enlargement or calculus.

(3) In the bladder—stones, fasciculation, diverticuli, chronic cystitis, carcinoma, retention of urine.

(4) In the ureters—dilatation, stone.

(5) In the kidneys—hydronephrosis, pyelonephritis, calculi.

(6) In the epididymus—epididymo-orchitis.

(7) Constitutional—general deterioration of health culminating in uræmia. Hæmorrhoids, inguinal herniæ from loss of muscle tone and straining at micturition.

Gonococcal conjunctivitis.—Gonococcal conjunctivitis is commoner in babies than in adults. I have, however, seen several cases in men. The organism can usually be cultured from the conjunctival discharge. The treatment is referred immediately to an ophthalmic surgeon, and the patient is put to bed.

Gonococcal rheumatism.—This is commonly in the wrists, ankles and feet, but all the joints are liable to be affected. During the acute stage, rest, heat, the application of unguentum guaiacol 5 to 10 per cent., and splinting are indicated, whilst by mouth large doses of sodium salicylate and potassium iodide are given. Deformities are carefully prevented by splinting and plaster.

On getting up, stout shoes or boots are worn to avoid painful flat feet, and the affected part is kept warm day and night by swathing it in wool—e.g. woollen socks, knee-caps, sleeves, wristlets. Mercurial bladder wash-outs are discontinued whilst

the iodide is taken, for the two react with the formation of mercuric iodide in the bladder, which is irritating.

For persistent pain, or when the condition is chronic, intramuscular or even intravenous injections of T.A.B. vaccine are usually effective in stimulating resolution, beginning with 25 millions and stepping-up by this amount to 1,000 millions.

Neurasthenia and phosphaturia.—Neurasthenia and phosphaturia are common. Anxiety is a prominent feature in patients with gonorrhœa ; they worry continually about their illness, they search daily for signs of meatal discharge, closely inspect their urine, and it is necessary to reassure them often that the following are physiological occurrences :—(1) Moisture at the external meatus in the early morning, especially if they have awakened with an erection. This is also seen after straining at stool. (2) A nocturnal emission approximately once a week.

Phosphaturia shows itself by milkiness or cloudiness of the urine, and causes alarm by its similarity to pus in the urine—the patient fears a return of the discharge. It is immediately recognized by the two glasses of urine being equally turbid, and it disappears on the addition of acetic acid. It is checked by 15 to 20 minims of dilute nitro-hydrochloric acid orally, three times a day.

The general nervousness is relieved by an optimistic attitude and the following mixture:—

R	Sod. brom.	}	-	-	-	āā	5 grains
	Pot. brom.						
	Calc. brom.						
	Tinct. nuc. vom.		-	-	-		15 minims
	Tinct. valerian.		-	-	-		30 minims
	Liq. arsenicalis		-	-	-		4 minims

Men frequently tell me that not only has the disease sapped their physical strength, but it has also removed their desire and will to train, and their determination to achieve the object in view, be it physical or mental. Their complete indifference to important matters of the career is surprising and regrettable. Encouragement in this respect and guidance with regard to recreation, sports and holidays are given. The deprivation of alcohol is felt keenly. The general health is supervised and dental treatment, which is frequently required, is suggested.

CLINICAL INDICATIONS FOR THE USE OF THE SPECIFIC HORMONE OF THE CORPUS LUTEUM

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Königsberg.

THE internal secretion of the corpus luteum was the second of the two ovarian hormones to be discovered. I was able to show (1930-1931) that the pathologically hyper-proliferated endometrium, which is produced by the protracted and excessive action of the follicular hormone and is the basis of the condition known as "glandular cystic hyperplasia," can be converted into the secretory phase by the administration of "proluton." Until recently the therapeutic employment of this hormone was seriously handicapped by the extreme difficulty in obtaining it in adequate quantities and by its great costliness.* Fortunately this obstacle has now been removed by the synthetic preparation of the hormone (Butenandt and co-workers). The synthetic hormone is in every way comparable to the earlier and more costly product.

Like the follicular hormone, the luteal hormone, acts not only on the endometrium but also on all the tissue of the genital tract. Of importance for therapeutic purposes is its effect on the uterine musculature. It renders the muscle cells larger and the uterine tissue more succulent, and enhances the circulation to the muscle; furthermore the musculature loses its power of reacting to posterior pituitary extracts. The following are the chief clinical conditions due to corpus luteum hormone deficiency.

* Thanks to the generosity of Schering-Kahlbaum A.G. in placing at my disposal material, which at the time was very costly and difficult and tedious to prepare, I believe I was the first investigator to try the effect of the corpus luteum hormone in women.

PATHOLOGICAL BLEEDING FROM THE ENDOMETRIUM
DUE TO GLANDULAR CYSTIC HYPERPLASIA

There is a type of disease in which the hormone of the corpus luteum is lacking and which occurs with greatest frequency in young girls or in elderly women. It has been given the name of glandular cystic hyperplasia of the endometrium and is the result of the persistence of a Graafian follicle (R. Meyer, R. Schröder). The follicular hormone secreted by it produces an excessive and protracted hyper-proliferation of the endometrium. This leads to bleeding which is not only irregular in time but may also be so copious as to produce severe secondary anæmia and serious constitutional disturbance. The cause of the bleeding lies in the fact that parts of the hyperproliferated endometrium become necrotic but at the same time the continued supplies of follicular hormone cause their renewal and the sites from which bleeding can occur are perpetuated. It is obvious that in such cases the follicular hormone is useless since already too much of it is present; the corpus luteum hormone, on the other hand, is wholly lacking. If luteal hormone is artificially supplied to the patient it will convert the hyper-proliferated endometrium into the normal secretory phase which ceases to bleed. If now the administration of luteal hormone is suspended, the secretory endometrium will be destroyed and cast off as in normal menstruation, provided that sufficient hormone has been given. The amount of luteal hormone necessary will vary in each case according to the extent and degree of the proliferation produced by the hormone secreted by its persistent follicle. It is important, however, that treatment should be continued for at least ten days. In some cases 1 to 2 mgm. daily will be sufficient. There are other cases, which want 5 to 10 mgm. daily; and sometimes I even had to give 5 or 20 mgm. per day. The following is the usual procedure:—

With slight hæmorrhage and little or no anæmia, I give small doses and if bleeding does not cease continue with higher doses. In more severe cases with marked hæmorrhage and advanced anæmia I begin at once with high doses. In any case, if after two or three days no definite result has been achieved or if after one to two injections there is no considerable

decrease in the hæmorrhage, I increase the dose at once. If a woman with hæmorrhage, who has been walking about, is suddenly put to bed, this alone may diminish the loss, and further any blood which is lost may accumulate in the vagina and, when the patient gets up again, it will be ejected and the patient will be thought to be bleeding again. For this reason, if anæmia is not severe, it is better to carry out the treatment without putting the patient to bed.

As was stated above, this form of hæmorrhage is most common in young girls and in women approaching the menopause. Indeed at these two periods of life uterine hæmorrhage is nearly always due to hyper-proliferation produced by the hormone of a persistent follicle. In spite of this, however, it is always necessary to exclude other possible causes of irregular bleeding. In young women, particularly virgins, this is simple enough. If no tumour is found on examination and there is no evidence of a blood disease, hormone treatment should be begun at once. In women who are at, or are approaching, the climacteric, hormone treatment should only be used when there is a recurrence of the hæmorrhage. At the first attack curettage and histological examination will serve to exclude non-hormonal causes and if a similar hæmorrhage occurs subsequently, as is common, hormone therapy can be instituted. Even if, in view of the patient's age (women of 45 and over) it is desired to produce inactivity of the ovaries immediately by means of X-rays, hormone therapy is still sometimes necessary since the effect of radiation is frequently delayed and one or more hæmorrhages may occur before it finally becomes effective.

Actually, the most radical and logical method of curing these cases of glandular cystic hyperplasia is to produce luteinization of the persistent follicle itself or else to destroy it. Unfortunately, there is as yet no suitable preparation of the gonadotropic hormone of the anterior pituitary which can be given rapidly enough in sufficient large doses. In severe cases with a dangerous degree of anæmia (particularly in young women), I have occasionally resorted to the direct transfusion of the blood of pregnant women, a procedure which has proved of great value. It must, however, be emphasized that at the same time large doses of luteal hormone should in

addition be given for several days. The luteal hormone rapidly effects the conversion of the hyper-proliferated endometrium into the secretory phase and produces immediate arrest of the hæmorrhage, and meanwhile the anterior pituitary hormone present in the transfused blood has time to bring about the luteinization of the persistent follicle. Five to ten mgm. are given on two to four occasions, i.e. until the luteinization of the persistent follicle has made sufficient quantities of endogenous luteal hormone available.

OTHER FORMS OF IRREGULAR HÆMORRHAGE

In the course of the following observations on the use of luteal hormone in other forms of irregular hæmorrhage, it will be assumed that in each instance other possible causes of bleeding (polypi, fibroids) have been carefully excluded prior to the institution of hormone therapy. Such hæmorrhages are often loosely termed "functional," without it being at all clear what this term connotes. It is necessary to state categorically here, that apart from derangements in the normal maturation process of the Graafian follicle there is no other ovarian cause of irregular hæmorrhage. It is known that normally the control of uterine hæmorrhage is dependent on two factors : the restitution of the surface of endometrium, and the contraction of the uterine musculature. With this in mind it can be understood that an under-developed uterus may either bleed too little as a result of poor development of the endometrium or too much as a result of poor musculature development and consequent insufficient contraction. Although experience shows that follicular hormone usually increases the hæmorrhage and luteal hormone diminishes it, it must not be assumed that the former is fundamentally a hæmorrhagic agent and luteal hormone an inhibitory one. It would be out of place here to explain the reason why follicular hormone produces contrary effects in different cases. Suffice it to say that luteal hormone given during or at the beginning of such attacks of irregular hæmorrhages serves to control them. Kaufmann and Bickel, Philipp and others have also reported upon this effect,

even when such small doses as $\frac{1}{2}$ to 1 mgm. were given daily for several days. Permanent effects were obtained by repeating this course of treatment several times. In some of my cases of definite glandular cystic hyperplasia in young girls, one thorough course of luteal hormone therapy has sometimes produced permanent regular menstruation after an initial period of amenorrhœa. In cases in which menstruation was previously normal, the cure of a single attack of irregular hæmorrhage with luteal hormone is of no great significance. When, however, patients who have had repeated relapses of irregular hæmorrhage, continue to menstruate normally after one or more courses of luteal hormone treatment, it may be claimed with some justice that the luteal hormone has a generalized regulating action on the course of future hæmorrhages.

HABITUAL EARLY ABORTION DUE TO HORMONE DEFICIENCY

When a woman persistently aborts at a stage in pregnancy when the placenta is not yet completely formed, it must be assumed that a deficient functional activity of the corpus luteum is responsible for the breakdown of gestation. It is known for certain that the corpus luteum hormone is necessary for the normal maintenance and development and modification of the endometrium and for the nidation of the ovum until such a time as the placenta is sufficiently developed to be able to function as an independent organ. After this has been achieved the destruction of corpus luteum no longer leads to a termination of pregnancy. Before this event, however, its elimination will lead to abortion. The artificial administration of corpus luteum hormone is capable of preserving pregnancy during this critical period. I will not refer in detail to the numerous publications which have appeared on this subject but will content myself with mentioning the article by Falls, Lackner and Krohn. These authors state that of 41 cases of habitual abortion they obtained definite results in 34. Similar experiences have been reported by Bishop, Cook and Hampson. My own experience is in entire agreement with that of

these authors. The dosage required will vary considerably since the corpus luteum hormone may be lacking in a greater or lesser degree. Sometimes, quite small doses of $\frac{1}{2}$ to 2 mgm. are sufficient, while in other cases much larger amounts must be employed. I usually give doses of 2 to 10 mgm. at intervals of two to four days, beginning eight to fourteen days before the critical period and continuing for at least fourteen days afterwards. I will give here a summary of a case which shows the importance of luteal hormone in such abortions.

The patient had been married for four years and had never conceived although every kind of therapeutic measure had been tried to produce a pregnancy. Finally, as a result of treatment with follicular hormone she promptly became pregnant. At the end of the third month she began to lose a little blood and to experience mild labour pains. Immediate treatment with 5 mgm. of progesterone at intervals of three days eliminated both the hæmorrhage and the contractions and a normal full term labour resulted.

THREATENED ABORTION

Threatened abortion due to trauma may also be successfully averted by means of luteal hormone, since apart from its specific action on the endometrium the corpus luteum hormone also inhibits the contraction or the uterine musculature. For this reason, no matter what other methods I adopt to stop hæmorrhage, I never fail to give injections of luteal hormone. The following case will serve as an example.

The patient, herself a physician, had had a nephrectomy about a year previously, for severe pyelonephritis. Following upon this she became pregnant and the other kidney became slightly affected. Later this developed into a long and tedious attack of pyelitis of pregnancy, in spite of which, however, with great care, the pregnancy was finally brought to a normal termination. At the end of the third month, however, an emergency of another kind arose. Following a fall in which she struck her abdomen, she commenced to bleed and to have labour pains. Complete and prompt arrest of both, however, was achieved in a few days by treatment with luteal hormone (doses of 5 mgm. per injection).

In threatened abortion due to trauma it is useless to waste time with small doses and I consider that 2 mgm. is the minimum which should be used. The injections should be repeated at intervals of two to three days until all symptoms

have been absent for some days.

HABITUAL LATE ABORTION OR PREMATURE LABOUR

From the knowledge that at the end of the third or beginning of the fourth month of pregnancy, the placenta has become an independently functioning organ and that from this time onward no more corpus luteum hormone is found in the ovary it might well be assumed on purely theoretical reasons that no useful effect could be expected from the use of luteal hormone in cases of abortion late in pregnancy. This view, however, is in contrary to a number of isolated publications reporting positive results in such cases. Since Adler, de Fremery and Tausk, Ehrhardt and co-workers, and van Lankeren have shown beyond dispute that corpus luteum hormone is present in the placenta, these publications have not only gained in practical significance but have also become easily comprehensible. It would appear that in human beings, the mature placenta assumes the function of the corpus luteum and that the corpus luteum hormone is still required during the later stages of pregnancy. It is also undoubtedly true that abortions occur late in pregnancy and that they can be effectively treated with corpus luteum hormone. Obviously other possible causes of late abortion, especially lues, must be excluded. As a positive demonstration of the action of corpus luteum hormone in such patients, the following case may be quoted, for although it did not lead to a finally satisfactory result, it is instructive:

The patient whose Wassermann reaction was negative on two separate occasions, had previously had two spontaneous abortions both at the fifth month of pregnancy, from which it was assumed that she would habitually abort at about this time. According to these data it was to be expected that the third pregnancy would tend to abort about May 18. Treatment was therefore commenced twelve days before the probable critical period, i.e. on May 7th, 5 mgm. of luteal hormone being given every three to four days. At the critical period slight pains began and exactly on May 18th she lost a trace of blood. An extra 5 mgm. of progesterone were given at once and treatment was continued until May 29th (twelve days beyond the critical period). The symptoms entirely disappeared and pregnancy continued. During the whole period the patient was up and about and no rest was prescribed. The patient was observed until June 19th. All appeared to be in order and the foetal heart sounds were audible. On June 21st (twenty-nine days after the last injection) the patient was admitted to hospital; the os was dilated to the size of half a crown and the head was well down and

the pains strong: abortion therefore seemed inevitable. In spite of the administration of morphine, a non-viable foetus (31 cm. long and weighing 850 gm.) was delivered an hour later.

Although abortion occurred in this case at the seventh month, it is clear that it was successfully averted at the fifth month. If she again becomes pregnant, I shall continue to treat this patient until the foetus is viable.

LUTEAL HORMONE AND ARTIFICIAL MENSTRUATION

My own experiments on both animals and women, and the clinical work of Kaufmann and others have clearly shown that by means of follicular hormone and corpus luteum hormone it is possible to produce regular menstruation after the suspension of hormone treatment.

CONCLUSION

While the above indications for the use of the luteal hormone are abundantly clear it does not mean that they are the only ones or that in the course of time others may not be discovered. It is possible, for instance, that this hormone may prove of great value in sterility in virtue of its influence on the Fallopian tubes, particularly their mucous membrane. Recently, I was able to show that previously occluded tubes became patent again as a result of follicular hormone therapy and I am now engaged in investigating the supplementary effect of corpus luteum hormone in such cases but at present I am unable to form any definite conclusions.

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GENERAL PRACTICE

XI—ON WRITING MEDICAL PAPERS

By SIR HUMPHRY ROLLESTON, Bt., G.C.V.O., K.C.B.

IN 1895 the senior physician of a London hospital, who resembled Dr. Samuel Johnson both in his downright personality and his literary touch, remarked in an obituary notice of his friend Octavius Sturges, senior physician to the Westminster Hospital, "he wrote because he had something to say, not because he had to say something." General practitioners do not have to write something to increase their panel practices; but too often they fail to put on record some of the lessons of their long experience and observation, so that valuable knowledge dies with them. In the last century when Dr. (later Sir) Clifford Allbutt had a busy consulting practice over the broad acres of Yorkshire, and the somewhat grim joke was current in medical circles that "no good Yorkshireman would rest quietly in his grave if, before his death, he had not been seen by Clifford Allbutt," he collected many pearls of empirical information, and passed them on in exchange. *The Practitioner* has been anxious and indeed a few years ago tried to perform the same privileged function. But busy practitioners, however willing they may be to help their colleagues, are somewhat prone to remain silent even from such good words, possibly in part because they are unduly mindful of the danger hinted at in Job's expressed desire that his "adversary had written a book." There are advantages, as well as the possible drawbacks of exposure to hostile criticism, attached to writing; according to Bacon it "maketh an exact man," and one of the best ways of learning all about a subject is to write a paper on it for discussion before the local medical society. The experience gained in arranging in proper sequence the heads and arguments of such a paper is a useful training for writing reports and formal statements. There is, however, a good deal of modesty or of inertia in seizing the opportunity to sit down and write.

Help in writing may be obtained from many sources. Some

books and papers specially deal with the construction of medical papers and of theses for the higher medical degrees, such as Sir Clifford Allbutt's *Notes on the Composition of Scientific Papers* (3rd edition, 1923, price 6s.) based on the experience of reading M.B. and M.D. theses for thirty years; in addition to its solid worth it has touches of humour; but I have failed to confirm the impression that he enforced the value of commas in the right place by quoting the immortal tombstone "Erected to the memory of John Jones who was accidentally shot as a mark of respect by his brother." A more recent volume is *The Writing of Medical Papers*, also in a 3rd edition (1929), price 7s. 6d., but out of print, by the late Mrs. Maud H. Mellish Wilson who from 1907 to 1933 was entrusted with the task of editing the enormous literary output of the Mayo Clinic. Among useful hints given in the late W. W. Keen's article on "Literary Methods in Medicine" (1905) was the recommendation of the methodical collection of materials for articles; thus on reading a journal, the titles of the articles should be catalogued by cross-entry under various heads; for example a paper entitled "a case of perforation of the popliteal artery by a splinter of bone in fracture of the femur" might be indexed under "Artery, popliteal, perforation of," "femur, fracture of, complication of" and so forth. In this way a store of headings and contents of articles on many subjects can gradually be built up. A useful source of reference for spelling, capitals, hyphens, and abbreviations is provided by "Authors' and Printers' Dictionary," by F. Howard Collins (the 7th edition by R. W. Chapman, 1933, price 4s.), and by "Rules for Compositors and Readers" (13th edition, 1936, price 2s.). H. W. Fowler's "Dictionary of Modern English Usage" (1926, price 7s. 6d.) gives much instruction about the art of writing, with examples of how, and how not, to arrange words in the right order, and about the proper use and meaning of words. All these are published by the Oxford University Press, London, Humphrey Milford. Sir A. J. Quiller-Couch's lectures on *The Art of Writing* (1923) published by the Cambridge University Press, sets a good example of extremely attractive reading.

In order to obtain information about the subject from books

and periodicals the best way is to consult the lists given under the heading of the diseases or conditions concerned, in the Index-Catalogue of the Army Medical Library, Washington, or the *Index Medicus* for the literature of the past, and the *Quarterly Cumulative Index Medicus* for the contemporary papers. Short abstracts may conveniently be made on slips of paper and clipped together in alphabetical order.

When provided with an observation or experience, new or interesting, and with material collected from other sources bearing on the subject, the title should be considered and made as clear and in the fewest words possible. Then it is important to begin to write out the account of the observations, for many would-be writers contemplate the attempt until it looms so difficult as to seem quite impossible, and it is put aside with a sigh of relief and never completed. This initial inhibition may be overcome by dictating the preliminary draft; but this necessitates very considerable revision, for most papers thus dictated and dispatched in their virgin innocence are extremely wanting in charm. When once the article is started the way is cleared to thought and the suggestion of new ideas for discussion and investigation. Though it is not advisable consciously to imitate the style of any particular author, it is a good plan before beginning to write, to attune the rhythm of expression by reading a few pages from the Bible, Milton's prose works, Joseph Addison's *Spectator*, and G. M. Trevelyan's histories and biographies, James Paget's *Clinical Lectures and Essays*, William Osler's *Aequanimitas* and *An Alabama Student*, or Michael Foster's *History of Physiology*.

Abbreviations such as T.B., C.S.F., W.R., U.V.L. (ultra-violet light), should be written out in full in the text, at any rate when first used. The first person singular should be reserved for important assertions, and quasi-modest substitutes such as "the present writer," "we" or "one" avoided, for "egoism may lurk even in impersonality" (Allbutt). The use of reign expressions, when an English word or short phrase is available and equally clear, is also undesirable.

There is a prejudice, perhaps exaggerated, against splitting an infinitive, for example "to more or less relieve the monotony." It might be argued that there is a tendency to over-do

the avoidance and to over-estimate (not of course to over estimate) this grammatical solecism. It is possible to collect examples of split infinitives from the writings of Walter Pater, Thomas Hardy, and Macaulay, but it perhaps savours of presumption to imitate these authorities so conscientiously. As a rule they should be avoided and usually can be, but too obvious performance of the manœuvre is bad taste.

At the end of the article a concise list of the conclusions should be given, and should be numbered 1, 2, 3.

The first draft when completed should be put aside for two or more weeks before revision, which must be deliberate and critical. Though poets may be born, writers of prose have to acquire lucidity and facility, as is shown by the autobiographical confessions of the early apprenticeship of subsequently successful authors, such as Robert Louis Stevenson and T. H. Huxley. The interval just suggested may put the writer at least partially in the position of a less biassed audience. Besides considering the order of the paragraphs and sentences, reading, perhaps aloud, each sentence to see if the words are in their proper order and express exactly what is meant, the writer should correct ambiguities, remove the tiresome repetitions so prone to disfigure dictated articles, and break up long and involved sentences. Care should be paid to the problem of presenting the ideas equally well in fewer words. Phil May, the black and white caricaturist, first drew his sketches in full detail in pencil, then worked over them in ink with the utmost economy of strokes, and finally rubbed out those left in pencil. Much the same method has been employed by prose writers, notably by Rudyard Kipling who in his recent autobiography, "Something of Myself" described how he practised at considerable intervals three such curtail-ing revisions, and incidentally conveyed much advice which writers might do well to read, mark, learn and inwardly digest. It is wise, though the sequel may be depressing, to submit for frank criticism what might otherwise be the final draft to a more experienced friend; for what may seem clear as crystal to the writer who knows what he meant may sadly puzzle and irritate the reader. Good manners are as important, if not more so, in the written word as in the less permanent spoken

word.

Quotations from and references to authorities are too often made without proper precautions. They should always be looked up in the original to see what exactly was said and where, for a touching faith in other sources may prove fallacious. Few pieces of advice are more constantly ignored than that given near the end of his long and literary life, to a younger seeker after excellence, by Martin Routh (1755-1854) for 63 years President of Magdalen College, Oxford; this ran "Always verify your references." Not infrequently quotations and references are copied from one article or book to another and may undergo remarkable transformations in this process. To trust to memory is dangerous. Sir Archibald Garrod, a most reliable author, always checked by the original sources the dates, volumes, pages, and other details in the references of his proofs; for strange transpositions of figures may occur in setting up the type. If it is impossible to consult the original work, the second-hand source should be acknowledged and thus incidentally be made responsible. This may seem a hard saying, and it certainly is a laborious discipline ; but it may save the reader, who after all is in the position of guest or client, much annoyance.

The most convenient method of arranging the references is to collect them in alphabetical order at the end of the article, and not to insert them in, and thereby interrupt, the text, or to make them footnotes. References are often numbered in the list at the end of the article, and this number, with or without the author's name inserted in the text to show his responsibility. This method has the disadvantage that the numbers may for one cause or another go astray. If the list of references is really complete, the numbering is unnecessary, for the author's name can be easily found in the alphabetical list. If two or more papers by the same author are quoted, the insertion of the date, in brackets, of the papers after his name in the text insures accuracy; and if two or more papers by the same author in the same year appear in the list at the end of the article, the letters a, b, c, or the numbers (1), (2), (3), should be attached to the date and inserted after the author's name in the text.

The reference should give the authors' surnames followed by their initials and the recognized abbreviation of the title of the journal, and when there are two journals with the same name published in different parts of the world or the same country, the name of the place of publication should be added. In many instances, for example, the *Edinb. Med. Journ.*, the place is indicated in the title. It must be extremely rare for two journals of the same name to be published in the same place; this did occur for a few years about a century ago: the *London Medical and Surgical Journal* was edited by Michael Ryan and published by Renshaw, but they "separated" and each continued to publish their own editions of the Journal under the original name. The date, the number of the volume and, as a rule, the first and the last pages of the articles should be given.

There are several possible ways of making the abbreviated references, The Index-Catalogue of the Army Medical Library, formerly called the Library of the Surgeon-General's Office, United States Army, long set the standard which has been followed in the *Index Medicus* and in the *Quarterly Cumulative Index Medicus*. It arranged the items as follows: Comroe, B.I. Thomsen's disease (myotonia congenita). *Am. J. M. Sc.*, Phila., 1935, clxxxix, 714-20. But in the fourth series (1936) of the Index-Catalogue a modification was made in the printing of the number of the volume, which now appears in Arabic, instead of Roman, figures and in bold-faced type: Jones, J. *Amer. J. M. Sc.*, Phila., 1941, **200**, 100.

Another method, the Harvard System is as follows: After the author's name and initials come the date in brackets, then the name of the periodical in italics followed by the number of the volume in Roman bold-faced type, and last the page in Roman type: Jones, J. (1941), *Am. J. M. Sci.*, **200**, 100. This scheme of arrangement is now in use in the *Proceedings of the Royal Society of Medicine*, *The British Medical Journal* (January, 1937), and the *Lancet*, and will be followed by *The Practitioner* in the new volume starting in July. These publications have issued directions to the contributors; that "on writing for the *Lancet*" (Supplement. Jan. 2, 1937) also contains much useful criticism of medical style and the best choice of words.

THE DOCTOR'S LIBRARY

BY THE LIBRARIAN OF THE BRITISH MEDICAL
ASSOCIATION.

THE number of medical books and journals published to-day has reached alarming proportions. I remember reading a suggestion that a central clearing house should be established where medical literature should be collated and sorted to prevent unnecessary duplication. This would be a boon to the busy doctor who wishes to keep up to date. Again, the rapidity with which successive editions of standard books appear does not tend to invite purchase. Fortunately, the new matter in a book is usually indicated in the preface, and it is possible to have a book interleaved by a binder and to copy the new material in an epitomized form from a new edition borrowed from a library. The time that this takes up is the chief drawback.

The general practitioner must have for reference a certain number of books, and it is the purpose of this article to give a list of books *which are in steady demand* and generally accepted as being of value. Tastes vary so much that several books on each subject will be listed, and the arrangement of the authors in alphabetical order will obviate criticism and controversy about the relative advantages of certain books. The lists indicate English and American books, primarily for the general practitioner. The specialist can learn of books on his own branch without difficulty, and the titles are too numerous to be shown in this article.

CHILDREN

(Diseases, Feeding, Welfare)

BROWNE (F. J.), *Antenatal and Postnatal Care*.

CASSIE (E.), *Maternity and Child Welfare*.

GARROD (Sir A. E.), *et al.*, *Diseases of Children*.

HUTCHISON (R.), *Diseases of Children*.

PATERSON (D.) and SMITH (J. F.), *Modern Methods of Feeding in Infancy and Childhood*.

THOMSON (J.), *Clinical Study and Treatment of Sick Children*.

CONTRACEPTION

- COX (G. M.), *Clinical Contraception*.
 FIELDING (M.), *Parenthood, design or accident? a manual of birth control*.
 HAIRE (N.), *Birth Control Methods*.
 HUTTON (I. E.), *Hygiene of Marriage*.
 MALLESON (J.), *The Principles of Contraception*.
 STOPES (M. C.), *Contraception*.

DERMATOLOGY

- MACKENNA (R. W.), *Diseases of the Skin*.
 MACLEOD (J. M. H.), *Diseases of the Skin*.
 ROXBURGH (A. C.), *Common Skin Diseases*.
 SAVILL (A.), *The Hair and Scalp*.
 SEMON (H. C. G.), *Atlas of the Commoner Skin Diseases*.
 WALKER (Sir N.), *Introduction to Dermatology*.

DIAGNOSIS (MEDICAL)

- CABOT (R. C.), *Physical Diagnosis*.
 FRENCH (H.), *Index of Differential Diagnosis*.
 HORDER (Lord) and GOW (A. E.), *Essentials of Medical Diagnosis*.
 HUTCHISON (R.) and HUNTER (D.), *Clinical Methods*.
 McDOWALL (R. J. S.), *The Science of Signs and Symptoms*.
 SIMPSON (S. L.), *Medical Diagnosis*.

DIAGNOSIS (SURGICAL)

- GOULD (P.), *Surgical Diagnosis*.
 LEJARS (F.), *Clinical Examination and Surgical Diagnosis*.
 QUERVAIN (de), *Clinical Surgical Diagnosis*.
 SHATTOCK (C. E.), *Handbook of Surgical Diagnosis*.
 WALTON (Sir A. J.), editor, *Textbook of Surgical Diagnosis*.

DIETETICS

- AYKROYD (W. R.), *Vitamins and other Dietary Essentials*.
 COMRIE (J. D.), *Diet in Health and Sickness*.
 HUTCHISON (R.) and MOTTRAM (V. H.), *Food and Principles of Dietetics*.

EAR, NOSE AND THROAT

- CROW (D. A.), *Ear, Nose and Throat in General Practice*.
 KERRISON (P. D.), *Diseases of the Ear*.
 MCKENZIE (D.), *Diseases of the Throat, Nose and Ear*.
 STEVENSON (R. S.), *Recent Advances in Laryngology and Otology*.
 THOMSON (Sir StClair), *Diseases of the Nose and Throat*.
 TURNER (A. L.), *Diseases of the Nose, Throat and Ear*.

FORENSIC MEDICINE

- BREND (W. A.), *Medical Jurisprudence and Toxicology*.
 SMITH (S.), *Forensic Medicine*.
 TAYLOR'S *Medical Jurisprudence*.

FRACTURES AND DISLOCATIONS

BÖHLER (L.), *Treatment of Fractures*.

PAGE (C. M.) and BRISTOW (W. R.), *The Treatment of Fractures and Dislocations*.

SPEED (K.), *Text Book of Fractures and Dislocations*.

GYNÆCOLOGY

BERKELEY (Sir C.) and BONNEY (V.), *Gynæcological Surgery*.

BOURNE (A. W.) and WILLIAMS (L.), *Recent Advances in Obstetrics and Gynæcology*.

EDEN (T. W.) and LOCKYER (C.), *Gynæcology*.

SHAW (W.), *Textbook of Gynæcology*.

TEN TEACHERS, *Diseases of Women*.

YOUNG (J.), *Textbook of Gynæcology*.

HEART AND BLOOD

COWAN (J.) and RITCHIE (W. T.), *Diseases of the Heart*.

DALLY (J. F. H.), *High Blood Pressure*.

LEWIS (Sir T.), *Diseases of the Heart*.

PRICE (F. W.), *Diseases of the Heart*.

VAUGHAN (J. M.), *The Anæmias*.

WHITBY (L. E. H.) and BRITTON (C. J. C.), *Disorders of the Blood*.

HYGIENE AND PUBLIC HEALTH

CURRIE (J. R.), *A Textbook of Hygiene*.

HUTT (C. W.) and THOMSON (H. H.), *Principles and Practice of Preventive Medicine*.

KENWOOD (H. R.) and KERR (H.), *Hygiene and Public Health*.

LEGGE (Sir T.), *Industrial Maladies*.

INFECTIOUS DISEASES

GOODALL (E. W.) and WASHBOURN's *Infectious Diseases*.

KER (C. B.), *Infectious Diseases*.

ROLLESTON (J. D.), *Acute Infectious Diseases*.

LIGHT TREATMENT AND MEDICAL ELECTRICITY

CUMBERBATCH (E. P.), *Diathermy*.

Essentials of Medical Electricity.

HUMPHRIS (F. H.), *Artificial Sunlight and its Therapeutic Uses*.

KOVÁCS (R.), *Electrotherapy and Light Therapy*.

RUSSELL (E. H.) and RUSSELL (W. K.), *Ultra-Violet Radiation and Actinotherapy*.

TROUP (W. A.), *Therapeutic Uses of Infra-red Rays*.

MEDICINE

BEAUMONT (G. E.), *Medicine*.

CONYBEARE (J. J.), *A Textbook of Medicine*.

OSLER (Sir W.) and MCCRAE (T.), *Principles and Practice of Medicine*.

PRICE (F. W.) editor, *Textbook of the Practice of Medicine*.

SAVILL (T. D.), *Clinical Medicine*.

TAYLOR and POULTON, *Practice of Medicine*.

MISCELLANEOUS

GEE (S.), *Medical Lectures and Aphorisms.*

HILTON (J.), *Rest and Pain.*

Medical Annual.

OSLER (W.), *Aequanimitas.*

NEUROLOGY

BRAIN (W. R.), *Diseases of the Nervous System.*

HOBHOUSE (N.), *Nervous Disorder in Infancy and Childhood.*

JELLIFFE (S. E.) and WHITE (W. A.), *Diseases of the Nervous System.*

NATTRASS (F. J.), *The Commoner Nervous Disorders.*

PURVES-STEWART (Sir J.), *Diagnosis of Nervous Diseases.*

ROSS (T. A.), *The Common Neuroses.*

OPHTHALMOLOGY

DUKE-ELDER (Sir S.), *Recent Advances in Ophthalmology.*

FUCHS (E.), *Diseases of the Eye.*

MAY (C. H.) and WORTH (C.), *Diseases of the Eye.*

NEAME (H.) and NOBLE (F. A. W.), *Handbook of Ophthalmology.*

PARSONS (Sir J. H.), *Diseases of the Eye.*

WORTH (C. A.), *Squint.*

OBSTETRICS

BERKELEY (Sir C.) and TEN TEACHERS, *Midwifery.*

EDEN (T. W.) and HOLLAND (E.), *Manual of Midwifery.*

HERMAN'S *Difficult Labour.*

JOHNSTONE (R. W.), *Textbook of Midwifery.*

QUEEN CHARLOTTE'S *Textbook of Obstetrics.*

WILLIAMS (J. W.), *Obstetrics.*

ORTHOPÆDICS

BROOKE (R.), *Shorter Orthopædic Surgery.*

FORRESTER-BROWN (M. F.), *Diagnosis and Treatment of Deformities in Infancy.*

JONES (Sir R.) and LOVETT (R. W.), *Orthopædic Surgery.*

MERCER (W.), *Orthopædic Surgery.*

WHITMAN (R.), *Treatise on Orthopædic Surgery.*

PHARMACOLOGY

BRUCE (J. M.) and DILLING (W. J.), *Materia Medica.*

CUSHNY (A. R.), *Pharmacology and Therapeutics.*

DIXON (W. E.), *Pharmacology.*

HALE-WHITE (W.) and DOUTHWAITE (A. H.), *Materia Medica.*

MARTINDALE (W.) and WESTCOTT (W. W.), *Extra Pharmacopœia.*

ROLLESTON (H.) and MONCRIEFF (A.) editors, *Favourite Prescriptions.*

WARD (E.), *Favourite Prescriptions.*

PSYCHIATRY

CRAIG (Sir M.), *Psychological Medicine.*

DEVINE (H.), *Recent Advances in Psychiatry.*

GORDON (R. G.) et al, *Introduction to Psychological Medicine.*

HENDERSON (D. K.) and GILLESPIE (R. D.), *Textbook of Psychiatry.*

STODDART (W. H. B.), *Mind and its Disorders.*

TREDGOLD (A. F.), *Mental Deficiency.*

RESPIRATORY SYSTEM

- BRAY (G. W.), *Recent Advances in Allergy*.
 DAVIDSON (M.), *Diseases of the Chest*.
 ELLMAN (P.), *Chest Disease in General Practice*.
 PUNCH (A. L.) and KNOTT (F. A.), *Diseases of the Respiratory System*.

RHEUMATISM

- COPEMAN (W. S. C.), *Rheumatism in General Practice*.
 FINDLAY (L.), *Rheumatic Infection in Children*.
 FOX (R. F.), and VAN BREEMAN (J.), *Chronic Rheumatism*.
 PEMBERTON (R.) *Arthritis and Rheumatoid Conditions*.
 POYNTON (F. J.) and SCHLESINGER (B.), *Recent Advances in the Study of Rheumatism*.
 RAY (M. B.), *Rheumatism in General Practice*.

SURGERY

- BAILEY (H.), *Emergency Surgery*.
 CHRISTOPHER (F.), *Minor Surgery*.
 ROMANIS (W. H. C.) and MITCHINER (P. H.), *Science and Practice of Surgery*.
 ROSE and CARELESS' *Surgery*.
 TURNER (G. G.) editor, *Modern Operative Surgery*.
 WILLIAMS (G.), *Minor Surgery and Treatment of Fractures*.

THERAPEUTICS

- BECKMAN (H.), *Treatment in General Practice*.
 BELLINGHAM-SMITH (E.) and FEILING (A.), *Modern Medical Treatment*.
 CLENDENING (L.), *Modern Methods of Treatment*.
 HUTCHISON (R.), *Index of Treatment*.
 LANGDON-BROWN (Sir W.) and HILTON (R.), *Physiological Principles in Treatment*.
 NORMAN (V.), *Essentials of Medical Treatment*.

TUBERCULOSIS

- BURRELL (L. S. T.), *Recent Advances in Pulmonary Tuberculosis*.
 DAVIES (H. M.), *Pulmonary Tuberculosis*.
 FISHBERG (M.), *Pulmonary Tuberculosis*.
 WINGFIELD (R. C.), *Textbook of Pulmonary Tuberculosis*.

UROLOGY AND VENEREAL DISEASES

- HARRISON (L. W.), *Venereal Diseases*.
 LEES (D.), *Diagnosis and Treatment of Venereal Diseases*.
 ROCHE (A. E.), *Urology in General Practice*.
 THOMSON-WALKER (Sir J.) and WALKER (K. M.), *Surgical Diseases and Injuries of the Genito-Urinary Organs*.

In conclusion I must emphasize that this list is based on the books asked for at the B.M.A. library, and on an experience of over twenty years in medical libraries.

INCOME TAX QUESTIONS

THE contribution on Income Tax in the General Practice Series, which appeared in the February issue of *The Practitioner* (p. 206), has attracted great interest. The following correspondence is published in order that it may prove of value to a wider circle than those practitioners whom it immediately concerns.

(1) *From a general practitioner in an east-coast town.*

I have read with great care your article on Income Tax in the February number and would like your advice on the following points. My rents and rates amount to £226. The Inspector wishes to allow only £100. You state you should ask for two-thirds. As regards servants you state that one can claim £50 maintenance per year. My Inspector wishes to allow only 12s. 6d. a week. Will you please let me know what you think of the above and if necessary will you put me in touch with an authority which will support the contention made in the article.

Yours faithfully,
A.B.C.

P.S.—I have a cook and two servants and have always claimed half their wages and maintenance. The Inspector now wants to allow only half the wages of two maids. My gardener also does some work such as fires, etc. Can I claim some part of his wages? I am told that your figures may apply to London but are too high for the country. Is this a fact?

Reply from the author of the article on Income Tax.

It is impossible to lay down hard and fast rules to cover all the points which arise in practice. Your subscriber will appreciate that the proportion of house expenses which may be charged against profits will differ widely according to the circumstances of particular cases. For instance, to consider two widely divergent cases, a practitioner whose main work was done in hospitals and who maintained only a small surgery at his private house for an occasional private case would clearly not be entitled to anything like the same allowance as a practitioner with a large private practice whose house was substantially devoted to the purposes of his profession. However, perhaps the following remarks may guide your subscriber towards finding, in his own special circumstances, a fair estimate of the allowances which he should receive.

Rent and Rates.—As stated in my article the allowance of two-thirds is a maximum and there is no definite title to such an allowance. The Inspector's offer to your subscriber is almost half the outgoings and is not unreasonable unless, in fact, your subscriber thinks that more than half the house is devoted to professional use. In such a case, I would advise him to approach the Inspector with a statement showing total accommodation and professional accommodation. In considering the division between professional and private use, due regard should be paid to situation. Usually the professional rooms account for the best rooms in the house.

Maintenance.—On general principles I consider that the offer of 12s. 6d. for maintenance is much too low. There is expert medical evidence to show that a minimum expenditure on food of 10s. per week per head is essential

to maintain health. Taking into account the altogether higher standards which will obtain in your subscriber's household and the much more expensive markets in which he must obtain his supplies I should be surprised to find that the maintenance of his staff costs less than £1 per week each. If he finds difficulty in having a reasonable claim admitted, he might perhaps be willing to put the matter beyond all doubt by working out his actual expenditure on foodstuffs for a single week and so find an accurate figure for the members of his household.

Wages.—This, again depends upon your subscriber's own arrangements. If he has a normal practice, I find it difficult to believe that only one-fourth of the labours of his staff is absorbed by professional work. I suggest that he point out to the inspector the extent to which each member of the staff is called upon to perform duties relating to professional work and that he ask for a greater allowance if he considers that his claim is justified by the facts. The gardener's help in the house should be pointed out to the Inspector, but, unless his duties extend beyond a few "odd jobs" it would hardly be worth claiming a separate deduction for him.

Your subscriber wishes for advice in regard to comparative price figures for London and the country. The figure of £50 may be subject to slight modification sometimes by reference to special local circumstances, but, in any case, paragraph 3 of my reply should settle your subscriber's difficulty in this respect.

(2) *From a general practitioner in a southern country town.*

Please see the enclosed letter from my auditor. It refers to page 221 of *The Practitioner* of February. I should be glad to know who is right.

Yours faithfully,
X.Y.Z.

Dear Dr. X.Y.Z.,

Wife's Earned Income Allowance.

The statement in *The Practitioner* that, by paying his wife £56 a year salary, a married man can save tax on £56 is incorrect. The saving is on £45 only, namely, the amount of wife's earned income allowance. For example, take a man with an income of £556 a year. If he makes no salary payment to his wife, he is given an earned income allowance of £111, that is one fifth. If he pays his wife a salary of £56, his income is £500 on which earned income allowance is £100. Against the assessment on the wife's income he will be given £111 earned income allowance and £45 wife's earned income allowance. The two allowances amounting to £56. In each case therefore the earned income allowance is £111 and accordingly the saving is in respect of £45 only. I trust I have made this clear.

Reply from the author of the article on Income Tax.

Your subscriber's accountant is correct. While the diminution of the practitioner's personal income is £56, I overlooked the fact that owing to the double operation of the earned income allowance, the effective relief from tax is on £45 only. I much regret this slip and trust you will convey to your subscriber my apologies for the inconvenience to which he and his accountant have been put as a result. Apparently even the expert is not proof against the stings and arrows of the income tax code! If you think it desirable to correct the error in a subsequent issue this can be done by a note to the effect that £56 on line 11 of page 211 should read £45 and £13 6s. od. on line 12 should read £10 13s. 9d. The other figures stand.

PRACTICAL NOTES

OXYGEN TREATMENT IN THE HOME

A. M. BURGESS and F. H. Chafee have recently stressed the importance of efficient treatment with oxygen of cases of coronary occlusion (*New England Journal of Medicine*, February 4, 1937, ccxvi, 203) manifesting signs of anoxæmia. They urge that such treatment can and should be carried out in the home, the place where most cases of coronary thrombosis are treated. Their remarks are equally true of many forms of pulmonary and cardiac disease. Cyanosis is usually regarded as the index of anoxæmia, but it cannot be too strongly stated that, in ordinary normal subjects, definite cyanosis indicates very gross oxygen lack. Cyanosis depends upon the absolute amount of reduced hæmoglobin present in the blood circulating in the capillaries of the skin and mucous membranes. It does not begin to occur until a minimum of 5 grammes of reduced hæmoglobin is present, the normal total percentage of hæmoglobin being about 15 grammes per cent. The severity of cyanosis as an indicator of anoxæmia is better realized by the fact that an anæmic individual who has less than 5 grammes of hæmoglobin per cent. cannot usually become cyanosed at all—a fact which should be realized by all anæsthetists. In practice it is wise to consider the very slightest sign of cyanosis, i.e. commencing blueness of the lips, in acute cardiac or pulmonary disease as signifying anoxæmia and calling for oxygen treatment. Anoxæmia causes impairment of cardiac nutrition which, in turn, produces poorer cardiac contractions. A vicious circle is thus established. Administration of an adequate quantity of oxygen breaks the vicious circle. In the opinion of Burgess and Chafee the oxygen tent is appropriate if it is possible to borrow it from the local hospital or from a supply service. On the other hand, the tent is too bulky, too expensive and too susceptible to ageing and disintegration of its rubberized fabric to be a reasonable investment for the man in private practice. The practitioner needs apparatus which is portable and durable. The authors draw attention to the possibilities of the nasal catheter and open box methods when the oxygen flow is properly measured by a suitable flowmeter. By these relatively simple means high concentrations of oxygen can be secured in alveolar air continuously at a cost of, in this country, about ten to thirty shillings per 24 hours. American references are given, but improved methods have been described recently in England: Nasal catheter, Marriott, H. L., and Robson K., *British Medical Journal*, January 25, 1936, i, 154; Open box mask, Campbell, J. A., *British Medical Journal*, June 20, 1936, i, 1245.

METHYLENE BLUE FOR CARBON-MONOXIDE POISONING

ACCORDING to a note in the *Bruxelles-Médical* (February 21, 1937, 634) inspired by Professor A. Langelez, Inspector General and Head of the Service Médical du Travail, the use of methylene blue in carbon-monoxide poisoning should be more widely known than it is. This method consists of injecting intravenously 50 c.cm. of a 2 per cent. solution of methylene blue in physiological saline and this can be repeated, if necessary, after an interval of fifteen to thirty minutes. This antidote has been in use for some years for dealing with cases of cyanide poisoning and it seems likely from the published accounts that it is also of value when the carbon monoxide is the intoxicating agent. Artificial respiration must, of course, not be excluded and the use of oxygen and carbon-monoxide mixtures, when available, must also be used.

THE PRESENT STATUS OF THE PREVENTION AND TREATMENT OF INFLUENZA

RECENT reports of promising researches in regard to influenza have naturally led to inquiries from practitioners concerning possible specific preventive and therapeutic agents for combating influenza. To satisfy such inquiries the editor of the *American Journal of The Medical Sciences* requested two bacteriologists engaged in influenza research, H. Pettit and J. Stokes, to contribute their views. Their article appears in the March issue of the journal, page 423. They state: "When the physician is called to a house full of patients, he still must rely on his own experience or the general treatment recommended in the current textbooks. He knows that uncomplicated influenza is a mild febrile disease lasting 4 or 5 days and leaving the patient weak out of all proportion to the activity of the acute stage. He knows that the complications are frequent, severe, disabling and often fatal. The patient must be put to bed as early as possible and kept there until at least 48 hours after he has become afebrile. Diet should be entirely liquid, being a total of 2,000 to 3,000 c.cm. ($3\frac{1}{2}$ to 5 pints) per day for adults, given in small amounts and frequently during the height of the illness. Soft food should be given on or about the fourth day, followed by a slow return to normal diet. A small enema is preferred to laxatives. Cathartics should be avoided. The cough should be treated by methods designed to make the sputum liquid and therefore more easily expectorated, rather than by methods designed to suppress the cough. Aches and pains may be modified by the judicious use of aspirin, but excessive sweating is dangerous. Pneumonia is the chief complication to be avoided; other complications are meningitis, encephalitis, pleurisy, bronchitis, otitis

and nephritis. Good nursing is the best method of staving off complications. If possible the patient should be isolated, not only for the protection of others, but for his own protection. The herding together of influenza patients in hospital wards is to be avoided on account of the probable spread of secondary invading bacteria."

ICHTHYOL IN THE TREATMENT OF WOUNDS

E. BOSCH (*Schweizerische medizinische Wochenschrift*, February 13, 1937, lxxvii, 138) writes enthusiastically on the value of ichthyol in the treatment of various types of wounds. He has employed a 5 per cent. watery solution in which sterile gauze has been soaked and then gently squeezed until no more fluid can be expressed. Layers of this gauze are then laid on the wound and the whole kept in place with a piece of rubber sheeting. This must not be too tightly applied so that the discharge from the wound can be slowly absorbed. With infected wounds the dressing should be changed daily, but if primary asepsis has been obtained a change every second or third day is sufficient. It is claimed that in this way a very high bactericidal action is obtained in the wound and mention is also made of definite soothing effects. Healing is held to be greatly facilitated by this form of dressing.

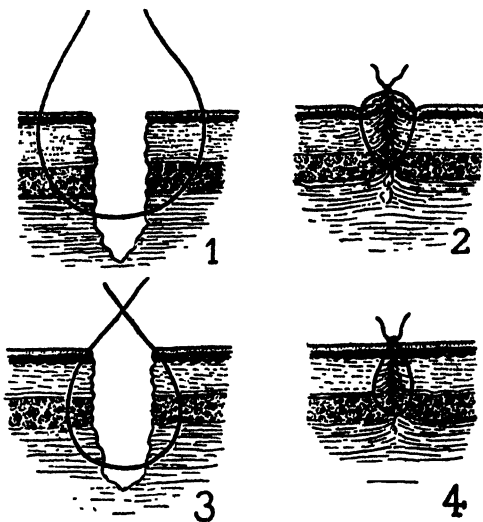
THE USE OF PENTOBARBITAL SODIUM FOR NAUSEA AND VOMITING FOLLOWING X-RAY TREATMENT

NAUSEA and vomiting as a complication of X-ray therapy has been the concern of the radiologist since the advent of this mode of treatment. The causes of the sickness are not definitely known; whether it is a toxic effect on the higher centres or a reflex action over the sympathetic or parasympathetic system has not been absolutely established. To overcome it many therapeutic agents have been tried but, because of their failure, have fallen into disuse. W. C. Popp and M. W. Binger now report good results from the routine use of pentobarbital sodium (*Radiology*, February, 1937, xxviii, 211). They settled upon this particular barbiturate after trial of many other sedatives. They found the most satisfactory method of administration to be by a suppository, containing 3 grains of pentobarbital sodium, inserted immediately following a session of treatment. Most of their patients were out-patients and oral administration was precluded because if the patient took the drug before treatment the hypnotic effect by the conclusion of treatment was too great for the patient to return home unattended, while if taken after treatment the ingestion of the capsule itself frequently seemed to precipitate nausea and vomiting. Careful study of 175 patients who had received pentobarbital sodium, in all of whom nausea and vomiting was expected to occur after treatment, revealed that 61.1 per cent. received complete relief

from X-ray sickness, 18·3 per cent. had only moderate nausea, 10·9 per cent. had nausea with very slight amount of vomiting, and 9·7 per cent. obtained no relief. They conclude that since pentobarbital sodium is easily available, inexpensive, easily administered, and in their experience without harmful effects, its use in controlling X-ray nausea and vomiting is definitely indicated. The trade name of pentobarbital sodium is "nembutal."

THE TREATMENT OF FACIAL INJURIES

POINTING out that the results of facial surgery will certainly be daily examined by the unfortunate patients, L. Dufourmentel (*Presse médicale*, March 13, 1937, xlv, 387) lays down certain rules for the securing of good results. First he points out that infection is inevitable in most instances and such infection is of little importance because it is never serious. It follows that every possible portion of damaged tissue should be conserved so as to avoid large areas of scar tissue. The second point made is that the bony displacements should be reduced in closest collaboration with a dental surgeon and certain



manœuvres are described in addition, for dealing with other portions of the facial skeleton. Thirdly the author deals with the methods to be employed in suture of superficial facial injuries so as to avoid as far as possible the disfiguring effects of stitch marks and the "strangling" of sections of the epidermis. The avoidance of this last danger has resulted in the method of passing sutures as in the lower portions of the diagram here reproduced.

THE USE OF APPLE POWDER IN THE TREATMENT OF DIARRHŒAL CONDITIONS

OF recent years papers have been appearing in various countries drawing attention to the value of apple diet in the treatment of intestinal disorders. A fresh communication on the subject is made by I. A. Manville, E. M. Bradway and A. S. McMinis (*Canadian Medical Association Journal*, March, 1937, xxxvi, 252), who have used a

powder prepared from apples, 15 grammes of the powder being obtained from 100 grammes of raw apple. The advantages claimed for the powder are (1) the powder represents a product of high and uniform potency; (2) the æsthetic difficulties of taste and colour are overcome; (3) the co-operation of the parents, in the cases of children, is more readily obtained, as it is not an easy problem to convince a mother that the same raw fruit which has often enough been the cause previously of diarrhœa among her children would also correct this very disorder; (4) the bulk of apple pulp makes dosage difficult; (5) the pulverized cellulose threads of the powder make a smoother stool; (6) the powder can be added easily to milk formulæ and will not produce curdling; (7) it represents a product of uniform price, available at all times of the year; (8) it keeps well, is light and compact; (9) it is not rejected when given to children who are vomiting. It is, however, admitted that in the preparation of the powder a large proportion, if not all, of vitamins A and C are destroyed, but the balance of advantage is considered to lie with the powder as compared with pulp. The authors state that a review of the case histories available in the literature of patients who have been treated with raw apple pulp for various intestinal disorders reveals 1,005 complete recoveries in 1,021 cases. They claim remarkably good results from their apple powder and state that it is a very potent preparation in the treatment of intestinal disorders, particularly in infants.

HISTAMINE FOR RHEUMATISM

IN the course of a symposium dealing with different aspects of histamine as a therapeutic agent, L. Perlès (*Progrès médical*, January 30, 1937, 178) describes the use of this substance in rheumatism. He employs a solution of histamine bichlorhydrate in the strength of 0.5 mgm. per cubic centimeter and to this he adds a small dose of a local anæsthetic. Employing a syringe marked in 0.05 of a cubic centimetre, he then injects intradermically a series of minute doses, over an area where the patient indicates that he has pain, after this has been prepared by washing with methylated spirits. Each injection is about $\frac{1}{80}$ to $\frac{1}{50}$ of a cubic centimetre and separated by at least 1 cm. Injections must be made rapidly and not more than $\frac{1}{4}$ to $\frac{1}{2}$ mgm. of the histamine should be used in all at each session. At the start the first three or four series of injections are made daily, and later spaced usually at every second day. The total number of injections depend upon the results, but if no benefit is obtained after ten sessions, the treatment should be discontinued. It is claimed that the results not only upon the pain, but also upon the general rheumatic condition are very satisfactory. The method should not be used in infectious rheumatism in the acute or subacute stages.

REVIEWS OF BOOKS

Report of the Medical Research Council for the Year 1935-1936. H.M. Stationery Office, 1937. Price 3s.

THE latest report of the Medical Research Council may be regarded as the current manifesto of what has been happily and topically described by a contemporary as the "united research front." Indeed the introduction in its survey of what has been and is being accomplished not only at the National Institute at Hampstead but also in more than a hundred local research centres in the British Isles is a masterly exposition of the present state of medical progress. The large number of local centres where the central body is able to help is a good reply to those who criticise the Council's policy as being narrow. Research on influenza is mentioned first and the historical incident of the ferret's sneeze is described in a modest paragraph. Nutritional research, the prevention of puerperal sepsis, research into deafness, and cotton dust "asthma" are other subjects chosen for introductory comment. As in previous years this "official" document can be strongly recommended for its interesting contents and for the fascinating stories of items of possibly epoch-making research work.

Blood Cultures and their Significance. By HILDRED M. BUTLER, B.SC. London: J. and A. Churchill, 1937. Pp. xiv and 327. Illustrations 3. Price 15s.

THIS is the third volume of the series of monographs, edited by Dr. W. J. Penfold, from the Baker Institute of Medical Research, by the bacteriologist of that Institute and of the Alfred Hospital, Melbourne, Victoria. When Miss Butler began her work only about 10 per cent. of the routine blood cultures were positive, but after years of work the percentage of positive results has increased threefold, and it is hoped that as a result this method of investigating disease will be more often utilized. The first three chapters deal with the general aspects of the subject, and the following seventeen chapters are devoted to consideration of the nature, duration, and significance of bacteraemia in various diseases, such as pneumonia, endocarditis, puerperal sepsis, tuberculosis, rheumatic fever, rheumatoid arthritis, and streptococcal, staphylococcal, meningococcal, enteric, gonococcal, and anaerobic infections. When necessary special methods of cultivation are described. Each chapter has an alphabetical list appended to it giving the references to the authors quoted. In lobar pneumonia blood cultures though of little value in diagnosis are most important in prognosis and in connection with serum treatment. It was formerly thought that pneumonia was a general infection which then was manifested by a lesion in the lungs; the reverse sequence has been shown to be the case. Another interesting chapter is that on undulant fever and abortus infections; in this country the number of positive blood cultures in the latter infection have been low, and as this may have been due to the want of special methods, the suitable technique is fully described. This is an admirable book and should be a valuable source of reference.

High Blood Pressure. By I. HARRIS, M.D. in collaboration with C. N. ALDRED, M.D., J.T. Ireland, B.Sc., and G. V. JAMES, M.Sc., A.I.C. Oxford Medical Publications. London: Humphrey Milford, 1937. Pp. xx and 132. Figs. 22. Tables 37. Price 10s. 6d.

THIS is not a textbook, but an account of team work on high blood-pressure, or hypertony, as it is here called, undertaken by laboratory workers in conjunction with Dr. Harris at the Liverpool Heart Hospital. It contains numerous tables of chemical analysis bearing on the question whether or not high protein diets raise the systolic blood-pressure, on the serum protein under high and low protein diets, and on the metabolism of nitrogen, sodium, potassium and calcium. Among the tabulated conclusions attention may be drawn to the following: a low protein intake reduces arterial pressure; the type of protein does not affect arterial pressure, milk protein being as harmful as that contained in beef, the quantity being the important factor; blood calcium and potassium are increased on a high protein diet. The only method by which the incidence of a very high mortality from hypertension and allied diseases can be diminished appears to be a warning from the medical profession against the dangers of excessive eating.

What is Osteopathy? By CHARLES HILL, M.A., M.D. and H. A. CLEGG, M.A., M.B., M.R.C.P. With a Preface by H. G. WELLS. London: J. M. Dent & Son, Ltd., 1937. Pp. xix and 217. Illustrations 10. Price 7s. 6d.

THIS book by the Deputy Medical Secretary of the British Medical Association and the Deputy Editor of the *British Medical Journal* is intended primarily for the lay public, and perhaps this is one reason why one who knows the mind of the great public so long and successfully as Mr. H. G. Wells must do, has been asked to write the preface. In it he points out that it is the nature of man to rebel against medical authority, that in self-defence the medical profession have tended to adopt a trade union policy, and that by not advertising the profession simply fertilizes the soil for the advertisements of patent specifics. He is, however, not out to bait the profession, as, he says, his friend G. B. Shaw is, and he states that "osteopathy, considered as a system of medicine or as anything more than the manipulative side of surgery, is impudent balderdash." It appears that osteopathy was revealed at 10 o'clock on June 22, 1874, to A. T. Still (1828-1917) who was more influenced by belief than by reason, and had no use for laboratories, for he recognized the danger of introducing too much science into the osteopathic system. The osteopaths have learnt much from bone-setters, and, though somewhat tardily, surgeons have assimilated manipulative treatment; there is therefore every reason why those who are anxious to have such treatment should have it without the risk attaching to its employment in undiagnosed conditions. The authors after full discussion of the claims of osteopaths conclude that osteopathy is based not only upon insufficient evidence but upon insufficient knowledge of what must be the basic sciences of any scientific system of healing; that no patient should receive manipulative treatment until his condition has been correctly

diagnosed, and that this is unlikely to be made by anyone who has not had a thorough medical training; and that osteopaths in search of State registration should first get on to the Medical Register.

Latent Syphilis and the Autonomic Nervous System. By GRIFFITH EVANS, D.M., F.R.C.S., D.O.M.S. Second edition. Bristol: John Wright & Sons, Ltd., 1937. Pp. xi and 171. Illustrations 50. Price 7s. 6d.

WARTHIN showed the extremely widespread invasion of the tissues by the *Treponema pallidum*, and Mr. Griffith Evans has brought together a wealth of clinical material to show that latent syphilis is responsible for many more morbid conditions than has been thought, this being effected indirectly by the autonomic system. Thus he discusses the part played by syphilis in the production of malignant disease, the "chronic abdomen," and even pes cava. The illustrations, especially those of microscopic specimens, are well reproduced.

NEW EDITIONS

Halliburton's Handbook of Physiology and Biochemistry, revised by R. J. S. McDOWALL, M.B., D.SC., F.R.C.P.E. (John Murray, 18s.) appears in its thirty-fifth edition only two years after the previous issue. The title now includes "biochemistry" which is not only a tribute to Halliburton's own interest in what he termed "chemical physiology" but a true reflection of many of the changes which have taken place in recent years. The popularity of this textbook obviously continues.

The Common Neuroses by T. A. ROSS, M.D., F.R.C.P., is now issued in a second edition (Edward Arnold & Co., 10s. 6d.) and the author states that during the seventeen years since the book first appeared he has seen no reason to change the view that the majority of patients suffering from neurosis could be treated by general practitioners. This "introduction to psychological treatment for students and practitioners," to quote its sub-title, is notable for its wide outlook and practical nature.

A THIRD and thoroughly revised edition of *Dietetics for the Clinician* by MILTON A. BRIDGES, B.S., M.D., F.A.C.P. (Henry Kimpton, 45s.) presents a vast amount of up-to-date material on diet based more upon the analysis of food in the actual edible state than in previous volumes. Dr. Bridges has secured the help of many experts to deal with special subjects and an "appendix" occupying about one-quarter of the book contains an amazing collection of facts. As a work of reference for any aspect of dietetic problems this volume should be of great value.

Vitamins in Theory and Practice by LESLIE J. HARRIS, SC.D., D.SC., in a second edition (Cambridge University Press, 8s. 6d.) has been revised to bring up-to-date the lectures originally delivered at the Royal Institution in 1934 and published in the following year. This remains easily the best short popular account of the vitamins available and can be warmly recommended.

The Extra Pharmacopœia, Volume I, in its twenty-first edition mentioned in the April number of *The Practitioner* is published by The Pharmaceutical Press at the price of 27s. 6d. It is regretted that the publisher and price were incorrectly quoted.

NOTES AND PREPARATIONS

MARIENBAD

MODERN work on mineral metabolism has revised an interest in those spa waters which contain potassium, sodium, calcium magnesium and other elements. Marienbad has not only its attractive situation and pleasant surroundings to commend it but also its famous springs which have for many years been recommended in metabolic disorders and it now seems likely that the mineral content of the Marienbad waters is of scientific importance. Medical practitioners who are interested are invited to write for particulars to Dr. Hans Kopf, Marienbad, who is prepared to arrange hospitality for medical visitors.

HUNTERIAN SOCIETY: GOLD MEDAL FOR PRACTITIONERS

ANY registered general practitioner resident within the British Empire is eligible to compete, and the medal, which is of gold, is awarded annually to the writer of the best essay on a subject selected by the society. Competitors—men or women—must be engaged in general practice and essays should be sent in by December 31. The essay must be unpublished and original, and be based on the candidate's own observation, but it may contain excerpts from the literature on the subject, provided that reference be made to the articles from which they are taken. A copy of the rules and any further information can be obtained on application to the Honorary Secretary, Mr. Arthur E. Porritt, 27, Harley Street, W.1. The subject selected for the essay is:—

1937.—“The Prognosis and Care of Heart Disease in General Practice.”

1938.—“The Management of Inoperable Malignant Disease in General Practice.”

The 1936 Hunterian Gold Medal for Practitioners was won by Dr. L. J. A. Parr, of Sydney, Australia, for his essay on “Rheumatoid Arthritis.”

NEW PREPARATIONS

ACROSONE.—This is a new antiseptic for which several important claims are made such as its Rideal-Walker value of 13, which is approximately five times as strong as lysol. It gives a relatively clear solution in water, is not perfumed and is non-irritant to normal skins, even in an undiluted form. It further has no deleterious action on stainless steel, nickel, aluminium, iron or rubber. The sole distributors are Messrs. James Woolley, Sons & Co., Ltd., Victoria Bridge, Manchester 3, who supply this new antiseptic at the following retail prices—4 oz., 1s. 6d.; 8 oz., 2s. 6d.; 16 oz., 4s. Larger quantities in half gallon and one gallon tins are also available.

DALTOSE.—Recent pædiatric experience of the most suitable form of soluble carbohydrate addition to cow's milk for infant feeding, points to the conclusion that a mixture has many advantages over the use of a single

sugar. Such a suitable product has now been formulated by Messrs. Cow & Gate, Ltd., in the form of Daltose C.G. This contains the equivalent of dextrans and maltose readily soluble in water and milk, and fortified by the addition of a natural vitamin D concentrate. Daltose is therefore a reliable and convenient carbohydrate for modifying all milk mixtures in infant feeding.

KINOO BABY POWDER.—This is claimed to be a 90 per cent. pure silk powder. It is pure from acid irritating materials and bacteriological examination reveals a high degree of purity for a powder containing no antiseptic. It is manufactured by Messrs. Kinu, Ltd., 6, Finsbury Square, E.C.2.

PRENATALAC.—It is now generally recognized that the health of pregnant and nursing mothers is greatly influenced by their diets. During the last few months of pregnancy, when the foetal bones are being laid down, the calcium requirements of the foetus are high. It is equally well established that the growing foetus requires a large amount of iron, not only to manufacture its red corpuscles but to lay up a store for use during the period of suckling. The whole of this reserve is drawn from the mother. Prenatalac is a full-cream milk food containing added iron salts to the extent of 63 grains per pound ($10\frac{1}{2}$ grains per pint), and fortified by the addition of a natural cod-liver oil vitamin concentrate equivalent to 250 international vitamin D units, and 2,000 international A units per pint of reconstituted food. Feeding tests have demonstrated that prenatalac is well tolerated by mothers and that it is free from any constipating effects. It is the latest addition to the special forms of dried milk issued by Messrs. Cow & Gate, Ltd., Guildford.

SANGOSTOP.—A means of controlling hæmorrhage, said to be most effective and quite innocuous, is marketed in this country by Coates & Cooper, Ltd., 94, Clerkenwell Road, London, E.C.1. This preparation is essentially a purified pectin, a substance found under the cell membranes of plants and used by the Romans for arresting bleeding. Sangostop is an ester of galacturonic acid and it can be used in 1.5 per cent. solution by the intravenous or intramuscular route and in 5 per cent. solution for local application. Boxes of ampoules of the former strength are available at 9s. for 4 ampoules and bottles of the latter strength are sold as follows: 10 c.cm., 2s. 9d.; 60 c.cm., 6s.; and 150 c.cm., 11s. 7d.

SOLUSEPTASINE.—Another addition to the anti-streptococcal group of drugs is announced by Pharmaceutical Specialities (May & Baker), Ltd., Dagenham. This is a colourless compound of the sulphonamide group, soluble in water and suitable for parenteral administration. It is supplied in ampoules of 5 c.cm. and 10 c.cm. of a 5 per cent. solution and samples are available on request.

THE PRACTITIONER

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THE CARE OF THE PRE-SCHOOL CHILD

FOREWORD

By THE RT. HON. SIR KINGSLEY WOOD, P.C., M.P.

Minister of Health.

I AM happy to write a foreword to the series of articles on the Care and Treatment of Diseases of the Pre-School Child which *The Practitioner* is publishing. The efforts gathered into what may be called the child welfare movement have in the past been directed mainly towards the safety and well-being of the infant, and up to recent years the care of children between the age of one year and school age has received relatively less attention. This was perhaps to be expected since the deaths of infants are more numerous, and the result of extended health education amongst mothers, together with improvements in housing, in sanitation, in the care of food and the provision of medical and nursing assistance, was so substantial, indeed spectacular, in the saving of infant lives.

In May 1936, I addressed a Circular (No. 1550) to Local Authorities, reminding them of what remains to be done, through the exercise of the powers available to them under the Maternity and Child Welfare Act, 1918, to secure that all children in the pre-school age group should be so brought under observation that their parents should not lack guidance in matters of hygiene from trained health visitors, and that the children should receive proper medical examination and treatment whenever there is a departure from normal health, and disease or defect calling for remedy is suspected. This need for an extension of the medical care required by these

young children is well brought out by the numbers and kinds of defects which are found at medical inspection among those who at or about the age of five years enter the ordinary elementary schools. It is unhappily found that large numbers are admitted to school every year requiring immediate medical treatment for chronic inflammations of the nose and throat, for ear discharges and defective hearing, for skin diseases, for deformities and other conditions. Much of this unfitness and disease can be prevented, and to permit it to develop is wasteful of health as well as of money. It is, however, a source of satisfaction that the proportion of "entrant" school children showing defects (excluding dental caries, visual defects and observation cases) has fallen in recent years from 23 per cent. in 1925 to 16 per cent. in 1933.

The subject may be approached from another side, that of the number and causes of deaths of children aged one to five. The death rate in this age group has indeed fallen phenomenally during the lifetime of the present generation. The rate in 1926-33 was less than a quarter of that in 1861-70, and the rate in 1933-35 was only about 40 per cent. of that in the years immediately preceding the Great War. But there is still room for further improvement. In the five years 1931-35 nearly 77,000 deaths were recorded at ages one to five, giving a mortality rate of 6.6 per thousand children. This rate is significantly higher than the comparable rates in Norway, Sweden, Holland and Germany. And within our own country there are suggestive differences between the local rates. Deaths are proportionately more numerous in the larger towns as a group, and less numerous in the rural districts. The chief causes of death in order of numerical importance are pneumonia, measles, non-respiratory tuberculosis, whooping-cough, diphtheria and violence (chiefly burns, scalds, falls and crushing); and in the present state of human knowledge a great part of this mortality can theoretically be prevented.

Medicine increasingly recognizes the special claims of each age group and most of all perhaps those of growing children. The one-to-five year period is an epoch of very rapid physical

and mental development. The child has lost its static dependence on its mother, just as it has lost that immunity which she gave it as a temporary possession to certain diseases ; but the power of free movement, which may continually carry it into dangers, has come before the wisdom to control its actions has grown from experience, and in process of acquiring immunity to various infections it may itself be damaged by or succumb to an attack of one of them. The child is at this age highly susceptible to damage through deficiencies of diet, lack of sleep, and all those influences which may be deforming, as well as developing, its mental life.

If substantial improvement in the condition of the children is to be secured, two of the chief requirements are full use by the mother of the many facilities for education in matters of health, and sound medical advice and supervision. Here we are concerned primarily with the latter. The articles which follow display a wise selection of subjects of great importance medically in the one-to-five year period; the acute respiratory disorders, tuberculosis, inflammations of the nervous system, postural deformities, disorders of the skin, and diet for the pre-school child. Each deals with important causes of disability or death in young children, and each I conceive to have an important preventive as well as therapeutic aspect. They are all written by recognized authorities and I am glad to commend their study to readers of *The Practitioner*.

ACUTE RESPIRATORY DISORDERS IN THE PRE-SCHOOL CHILD

By CHARLES McNEIL, M.A., M.D., F.R.C.P.E.

Professor of Child Life and Health, Edinburgh University.

ACUTE respiratory disorders include the catarrhs and inflammations of the mucosal surface from the nose to the alveolar endothelium of the lungs. In this article the subject will be limited to a consideration of bronchitis and pneumonia in the first five years of life. The annual returns of the Registrar-General show that the aggregate of deaths from these two diseases in the first five years exceeds that of any succeeding five year period; and far exceeds that of the remaining years of childhood. Further if the deaths from measles and whooping-cough are added, and the great majority of these deaths are from bronchitis and pneumonia, this toll of early child life is greatly increased. It will be agreed that most fatal cases of bronchitis die of broncho-pneumonia: so that in dealing with bronchitis and pneumonia as serious and fatal diseases in the early period of life, we are mainly considering the two great types of pneumonia, broncho-pneumonia and lobar pneumonia, as produced by varying kinds of infection.

AGE INCIDENCE IN BRONCHITIS AND PNEUMONIA

THE influence of age on the incidence of bronchitis and pneumonia in childhood, and on the death rate from pneumonia requires a more exact definition than has been given above. If a large number of fatal and non-fatal cases of bronchitis and pneumonia in childhood are grouped according to age, it will be found that there is a remarkable concentration of these two diseases, and especially of pneumonia, in the first two years of life, and that the great majority of deaths from pneumonia occur in the same period. These facts are shown in the following table, comprising 648 cases of pneumonia of all types and including empyema, and 231 cases of bronchitis, grouped into three age periods, birth to two years, two to five years, and

five to twelve years. These cases were admitted to my ward in the Edinburgh Children's Hospital between 1921 and 1928.

AGE GROUP.	PNEUMONIA			BRONCHITIS		
	Cases	Deaths	Death-rate per cent.	Cases	Deaths	Death-rate per cent.
Birth - 2 years ..	310	136	44	155	5	3
2 - 5 years ..	184	18	10	55	1	2
5 - 12 years ..	154	9	6	21	0	0
Birth - 12 years ..	648	163	25	231	6	2.5

In this series one half of all the cases of pneumonia and five-sixths of the deaths occurred in the first two years: and the behaviour of bronchitis was closely parallel, two-thirds of the cases and five of the six deaths falling within the same period. Between two and five years there is a heavy drop both in the number of cases and of deaths in pneumonia; and after five years, while the number of cases shows no striking further decline, the death rate falls from 10 per cent. to 6 per cent. A recent American analysis of 1,000 cases of acute primary pneumonia in children from birth to thirteen years by Kohn and Weiner shows a close correspondence to this age incidence, one half of the cases being under two years, and three quarters under five years. The death rates in this series were considerably lower, being 32.4 per cent. under two years, and 19.9 per cent. over the whole series.

There can be little doubt that the first two years of life constitute a period of heavy incidence and great danger in regard to pneumonia and that in the third year a fairly sudden and definite change for the better takes place. This special susceptibility to pneumonia depends upon the special constitution of the body at this period of life and upon unhealthy factors of environment, particularly bad housing conditions. If a substantial reduction in these high death-rates from pneumonia in the first two years is to be achieved, there must be improvement in housing conditions and in the intelligent care and dieting of young children; improved methods of treatment of bronchitis and pneumonia may also

contribute to a decline.

**BRONCHO-PNEUMONIA AND ALVEOLAR (LOBAR)
PNEUMONIA**

It is agreed that the high death-rate from pneumonia in early childhood is largely due to the special prevalence of broncho-pneumonia at this age period: but there is disagreement as to the part played by the other pathological type of lobar pneumonia in cases that recover at this time. In the post-mortem room the differentiation of the two types is easy enough, and there the immense preponderance of broncho-pneumonia is accepted; but a small minority of cases of definite lobar pneumonia are found on post-mortem examination and there is clinical evidence to support the view that the less fatal type of lobar pneumonia is fairly common among patients with acute pneumonia who recover in the first two years of life. Even in the first year of life cases of acute pneumonia are common enough which run a short course and end in a critical decline of fever with rapid resolution, showing thus clinical features typical of lobar pneumonia. Bullowa and Greenbaum have published this year a study of pneumonia in children, in which out of a total of 262 cases under two years of age, they judged 151 to be of the lobar type, and 111 broncho-pneumonia. These figures may be compared with the Edinburgh Children's Hospital series of 253 cases of pneumonia under two years of which 143 were judged to be lobar pneumonia, and 110 broncho-pneumonia. These figures as to the relative frequency of lobar pneumonia and broncho-pneumonia in the first two years of life are contrary to general medical opinion. But the other view is worthy of consideration that in the first two years of life the two types of pneumonia are met with in fairly equal numbers, broncho-pneumonia with a high mortality, lobar pneumonia with a much lower mortality: and that after two years, cases of broncho-pneumonia show a heavy decline in numbers, whilst cases of lobar pneumonia maintain their numbers and prevail throughout the remainder of childhood. The term lobar pneumonia is unfortunate because in early childhood the consolidation seldom involves a whole lobe, while in confluent broncho-pneumonia

extensive consolidation involving a whole lobe or a whole lung is common. The term alveolar pneumonia has been suggested as a more accurate description of the lobar pneumonia of childhood: for in this type the inflammation is limited to the alveolar system of the lung, in contrast to the involvement of bronchi, interstitial tissue and alveoli in the type broncho-pneumonia.

CLINICAL FEATURES OF BRONCHO-PNEUMONIA AND ALVEOLAR PNEUMONIA

The question of the relative frequency of alveolar pneumonia and broncho-pneumonia in the first two or three years of life is perhaps of minor importance, for it is agreed that the high death-rate from pneumonia at this time is due to broncho-pneumonia. But with regard to prognosis it is a matter of some importance to pick out the much less serious from the more dangerous type: and there are certain clinical points which usually allow this distinction to be made. In both types it is common for the general signs of serious respiratory disease to be present for some days before evidence of inflammatory consolidation of the lung can be obtained: these general signs are prostration and dyspnoea. Cough is usually early and prominent in broncho-pneumonia and later becomes paroxysmal; in alveolar pneumonia cough is usually slight, infrequent and single, although if the pleura is involved, it is more prominent and is then short, suppressed and painful. In broncho-pneumonia there are early signs of bronchial catarrh, with moist sounds heard on both sides, while in alveolar pneumonia there is usually a complete absence of accompaniments, and at any rate of moist sounds. A general dusky cyanosis of the face is present in broncho-pneumonia, while in alveolar pneumonia, although cheeks and lips are deeply flushed, there is often a zone of circum-oral pallor. Even if X-ray examination is available, it may be negative and may fail to anticipate the findings of careful percussion and auscultation of the lungs; in other cases of limited alveolar pneumonia, and especially where there is a shallow strip of consolidation with pleural lymph effusion, the X-ray film will show a definite uniform shadow when

physical examination is completely at fault. With the advent of consolidation, physical signs on percussion and auscultation are unequivocal in both types of pneumonia; but in broncho-pneumonia crepitations are abundant both over the areas of consolidation and elsewhere, while in alveolar pneumonia the breathing is of high-pitched tubular type with few or no accompaniments. But when broncho-pneumonia has become confluent and extensive, either on one or both sides, accompaniments may disappear, and the loud, dry, tubular breath-sounds may be identical with those heard over an area of alveolar pneumonia. The termination of the two types of pneumonia is different: uncomplicated alveolar pneumonia has a short course of seven to ten days, and the fever ends by crisis or by short lysis; broncho-pneumonia, even of moderate severity, has a febrile period of not less than two or three weeks and often of many weeks, and ends in a gradual irregular decline of fever with a strong tendency to relapses. This difference in the termination of the two types is the surest way of distinguishing them.

SPECIAL TYPES OF ALVEOLAR PNEUMONIA

Brief remarks may be made on special clinical types of alveolar pneumonia. There are the cases, not uncommon, in which the area of consolidation is small, and the signs of its presence only appear after three or four days of high fever and serious general illness. There is also that puzzling and anxious type in which coma is present in the early days of illness with little dyspnoea and cough, and the clinical picture is that of tuberculous meningitis; and, again, the cases in which there is pleural pain with rigidity of the back and neck when a more acute meningococcal meningitis may be suggested. In other cases, in which pneumonia and pleurisy develop at the base of one lung, an acute abdominal inflammation, either peritonitis or appendicitis, is suggested by general abdominal rigidity pain and tenderness. Lastly, there is the serious and fairly common complication of empyema. In many cases of empyema, an acute pleurisy occurs early in the pneumonic illness, producing early thoracic pain with increased difficulty

of breathing, painful suppressed cough, and unusually early development of percussion dullness; and with these symptoms at this early stage, the occurrence of empyema after a week or ten days may be looked for, and this suspicion will be greatly strengthened if the area of consolidation shows no signs of diminution after a week or ten days.

TREATMENT

The main problem of treatment is centred in the group of bronchitis and pneumonia in the first two or three years of life when the majority of cases and the great majority of deaths occur. It is the concentration of cases of broncho-pneumonia in this group that accounts for the high death-rate at this time; and it is only by more successful treatment of broncho-pneumonia that it will be possible to lower this high death-rate. The general objective of treatment is to prevent the occurrence of broncho-pneumonia in cases of bronchitis, and to limit the spread of pneumonia if it has occurred. At this age many mild cases of bronchitis are met with which recover under simple treatment; but if a case of bronchitis maintains a temperature of 102° F. for more than a day, it should be regarded as one of potential broncho-pneumonia. In severe cases of bronchitis, in broncho-pneumonia and in alveolar pneumonia, it is of cardinal importance that active treatment should be given early, and applied thoroughly and boldly in the first few days of serious illness, for it is at this early stage that we may hope to limit the spread of pneumonia. A massive alveolar pneumonia under two years of age is always dangerous; a massive broncho-pneumonia seldom recovers.

Alveolar pneumonia is usually the result of a pure pneumococcal infection; in broncho-pneumonia the pneumococcus is accompanied by one or more other organisms, such as streptococci, staphylococci and Pfeiffer's bacilli, and the inflammatory changes in the lungs are far more serious. As yet the use of specific vaccines and sera in children has been disappointing: and has not been shown substantially to reduce the death-rate in any large series of cases. But it must be remembered

that in broncho-pneumonia the pneumococcus is not the only bacterial agent, and that the use of specific anti-pneumococcal serum alone in this type of pneumonia is not likely to solve the therapeutic problem, both because of the complexity of the bacterial factors and of the destructive effects of the inflammation upon the bronchial walls and lung tissues. If vaccine or serum is given, it should be given at the very beginning of the illness.

The main stay of treatment is assiduous skilled nursing, dieting and general treatment: and it is of great importance that these should be applied early before the signs of pneumonia have appeared. If such treatment cannot be obtained at home, the child should be sent to hospital as soon as high fever, prostration and dyspnoea have appeared, even in the absence of physical signs of consolidation.

It is agreed that a well-ventilated room with an open window is beneficial in acute pneumonia. But I would go further and advocate that the bed should be placed day and night beside a widely opened window, and whether it be winter or summer. An American physician wrote many years ago that the most important part of the treatment of acute pneumonia in children was that "nothing should come between the nose and the North Pole." Even in polar weather, it is really easy to keep the child warm, his bed-clothes covered with an electrically-heated blanket, his hands in gloves, and a woollen cap on the head. The resulting benefits are striking: the child becomes less restless, and sleeps much more both by day and night; breathing is easier and quieter and cough is less frequent; appetite improves. And these benefits do not seem to be an effect of light-radiation, but of a continuous current of cool air playing upon the heated skin-surface of the face. After an extensive trial for some years of this open air treatment in acute broncho-pneumonia, and alveolar pneumonia, I am convinced of its great and life-saving value. It does not cut short the period of fever, nor does it hasten resolution: but it certainly sustains and improves general strength and general condition; and I believe that it limits the spread of pneumonia, and reduces the frequency of empyema. The

earlier it is applied, the better.

Some remarks may be made upon diet. In the first day or two of the acute illness frequent vomiting is common, and with the high fever and scanty urine, acidosis is present. For the first day, it is wise to withhold milk and to give only abundant fluids in the form of sweetened fruit juices, cold water, and an occasional drink of weak sweetened tea; and in this period of initial acidosis moderate doses of potassium citrate, 45 to 60 grains per day, are useful. With the cessation of vomiting, milk and other light foods can be given, according to appetite: but throughout the period of high fever, harm may be done by giving too much milk; and it should be diluted, and should not exceed $1\frac{1}{2}$ pints a day. Abundant sugar must be given. Alcohol in the form of brandy is useful both as food and stimulant, given in moderate doses of 15 to 20 minims four times daily.

Light poultices, in the form of medicated kaolin (anti-phlogistine and caloplast) deserve a place in the treatment. Applied continuously for the first four days of the illness, they are comforting and seldom embarrass breathing. If they assist in limiting the spread of pneumonia, they are of real value in furthering one of the main objects of the early treatment.

Expectorants are out of fashion: they are certainly not needed in alveolar pneumonia, and they have probably no good effect in broncho-pneumonia: and they may be safely discarded. If cough is harsh and painful, the steam kettle may be combined for a short period with open air treatment, and is helpful. Cardiac stimulants should not be given as a routine: they are seldom required in the early days of the illness, but afterwards and in cases of extensive consolidation, moderate doses of the tincture of digitalis (3 to 5 minims thrice daily) may be given. Sedative drugs to control restlessness and procure sleep will be rarely needed, if open air treatment is used.

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TUBERCULOSIS IN THE CHILD OF PRE-SCHOOL AGE

By LEONARD FINDLAY, M.D., D.Sc., F.R.C.P.

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IT is well known that different age-periods have their own particular dangers. This arises not only from developmental considerations but also on account of varying susceptibility to, and vulnerability from, different infective processes. Consequently it is quite logical to discuss the question of the pre-school child by itself, and especially is this the case with regard to tuberculosis, for at this time of life this infection has not only its own characteristic manifestations but also its own peculiar prognosis.

MORTALITY

Until two decades ago the death rate from tuberculosis during the pre-school age, although not so high as during the first year of life, was, next to that for the first year, the highest throughout childhood and, what was even more striking, it practically equalled that met with during the most dangerous years of adult life (*see* Chart I). In adult life, of course, the high mortality was caused by pulmonary tuberculosis, whereas during childhood it was the non-pulmonary forms which were responsible for the majority of the deaths. Now, although the death rates for all forms of tuberculosis have greatly diminished since the early years of the present century, the fall has been relatively greater among the non-pulmonary than the pulmonary varieties of the disease. For example, between 1896 and 1935, the percentage fall in the death rate from pulmonary tuberculosis was 53·6 and from non-pulmonary tuberculosis 74·6.

The explanation of the above difference between the rate of decline of the death rates of these two varieties of tuberculosis is probably to be found in their different origins—the respiratory examples being caused by the human type of the bacillus and transmitted from person to person, whereas

the non-respiratory forms are due, or at least in the past were due, in great measure to the bovine type of the organism and result from the consumption of milk harbouring tubercle bacilli. Although within recent years control of both factors has been extensively practised, the elimination of the danger

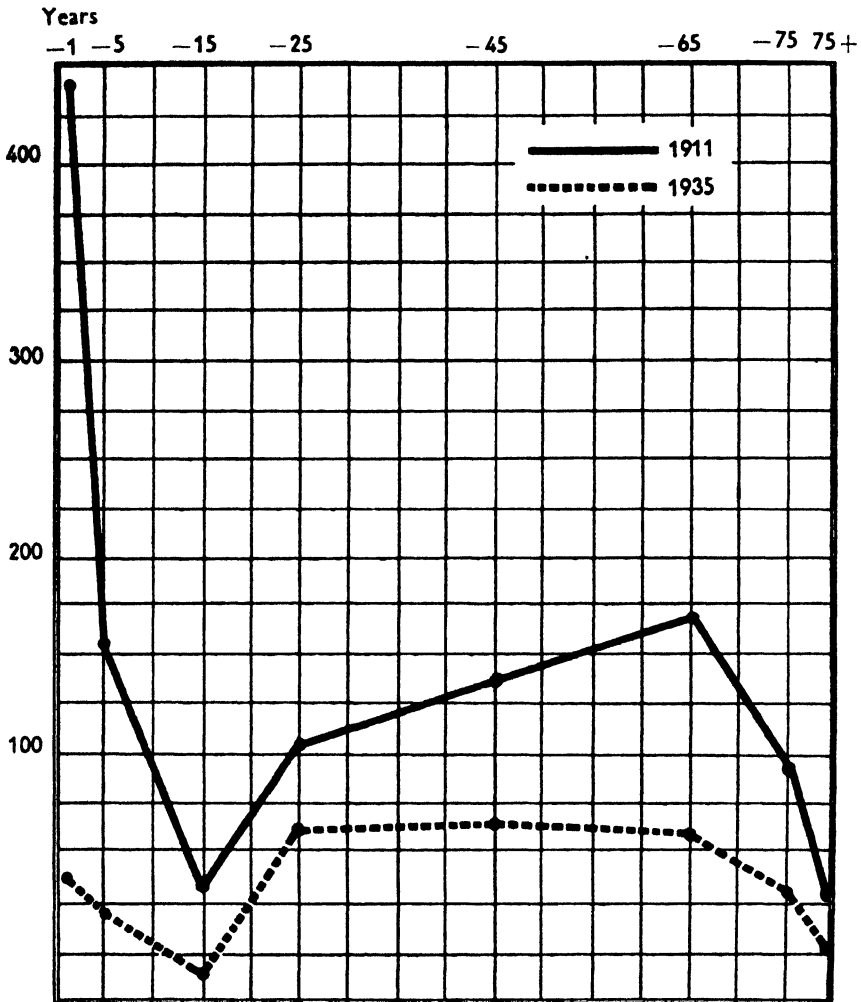


CHART I.—Deaths from tuberculosis (all forms) per 1,000,000 population (England and Wales).

of infective milk is the more easy—in fact it should be possible to extinguish almost entirely—and it would seem reasonable to conclude that the pasteurization of the bulk of the milk (over 70 per cent. for some years) distributed in the cities has had

much to do with the relatively greater fall in the death rate from non-pulmonary tuberculosis.

But whatever be the explanation of the relatively greater fall in the death rate of non-pulmonary tuberculosis, it would be expected that this fact would react most markedly on the death rate during the period of life, viz., childhood, when non-pulmonary tuberculosis was most prevalent. Indeed since 1911, the death rate during the first year of life from tuberculosis of all kinds has fallen by 84·9 per cent., and during the pre-school age by 72·9 per cent., whereas for all ages the fall has only amounted to 51·2 per cent. Thus, as seen from Chart I, the death rate from tuberculosis is now not higher during childhood than during any other period of life, as was formerly the case. It will, however, be noticed, what is a most important point in the present discussion, that the pre-school age can now be described as falling within the most dangerous zone of childhood.

INCIDENCE

It might be concluded that a fall in the death rate indicates a fall in incidence, but the answer to this question is not so simple as at first sight appears. The fall in the death rate might of course be due to a diminished incidence of the disease, but it might also result from a lessened virulence of the malady, an increased resistance of the individual or from a combination of all three factors. That there is a diminished incidence of the disease is held by not a few writers. Both Continental and American workers have contrasted the proportion of positive tuberculin reactions obtained in children in the same community at different dates since 1914, and have noted falls amounting to between 10 and 62 per cent. In the evaluation of these records it is important to point out that the highest and the lowest falls both emanate from the State of New York (Beaven¹ and Smith²). Beaven records the greatest fall (62 per cent.) and he also shows graphs revealing that the fall in number of child positive-reactors in his hospital during recent years is almost parallel with the fall in the death rate in the city from tuberculosis. As he further finds that, if anything, a higher proportion of the tuberculin

reactors present clinical and X-ray evidence of the disease, he can see nothing to suggest that the tubercle bacillus has lost any of its virulence and he therefore ascribes all the improvement in the tuberculosis problem in childhood to a fall in incidence.

I know of no extensive series of figures for this country dealing with this aspect of the tuberculosis problem. My own material which, however, is admittedly limited, lends no support to Beaven's thesis of a fall in incidence. I find, for example, that the proportion of the children admitted under my care to the Princess Elizabeth of York Hospital for Children during the last eighteen months, who react positively to tuberculin, is exactly what W. Gaisford³ found it to be six or seven years ago, namely—25 per cent. Moreover, as judged by hospital material, the proportional age distribution of the positive reactors in the East End of London to-day is very similar to what it was in Glasgow and the West of Scotland ten years ago (*see Chart 2*)⁴. My figures are therefore directly

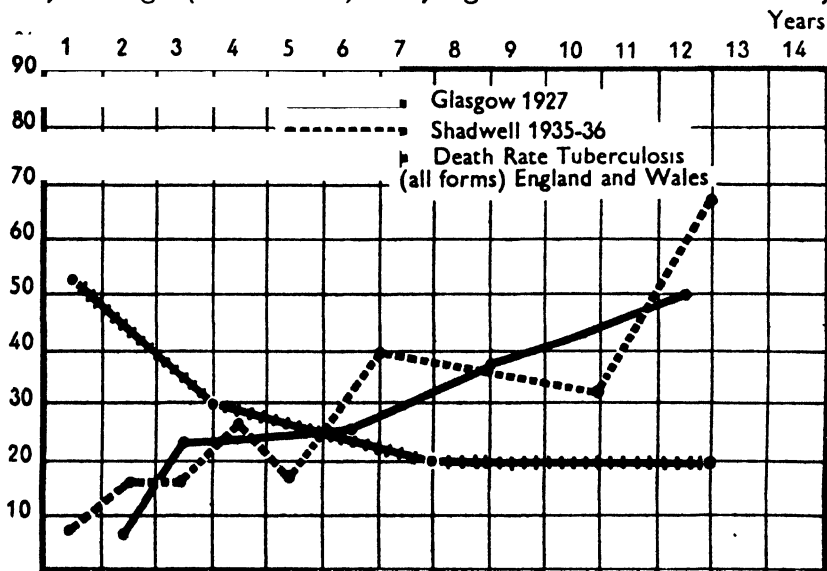


CHART 2.—Age incidence of positive Mantoux reactions in hospital patients (Royal Hospital for Sick Children, Glasgow, and Princess Elizabeth of York Hospital for Children, London.)

opposed to those of Beaven, and, in view of the falling death-rate, would rather suggest a lower severity of the infection, but whether this is due to a lessened virulence of the bacillus or

to an increased resistance of the host they offer no definite answer. Nevertheless, when it is remembered that the rate of incidence is directly, and the rate of death is inversely proportionate to the age of the child, it is quite apparent that some difference in the host does play a material part in this problem (*see* Chart 2). That this difference is due to increased resistance receives some support from the fact that within recent times records of recovery from what previously had been considered hopeless varieties of the disease (pulmonary and miliary) are appearing with increasing frequency in the literature.

VARIETIES OF THE DISEASE

There is no doubt that now-a-days far fewer examples of active tuberculosis are seen during any period of childhood. *Cervical adenitis*, for instance, has in great part disappeared. The rarity of scarring of the neck is in itself ample evidence; but Wakeley⁵ has given the question numerical decision by his recent observation that whereas 240 cases of tuberculous adenitis were admitted to King's College Hospital between 1909 and 1913, between the years 1929 and 1933 only 18 cases of this malady came under observation.

Abdominal tuberculosis is another variety of the disease which has become somewhat rare. In Glasgow, where this manifestation of tuberculosis was always more prevalent than in many other towns, the death rate from this cause for all ages between 1900 and 1930 fell from 32 per 100,000 to 3 per 100,000 of the population, i.e. a fall of 90·6 per cent., and during pre-school age from 159 to 5 per 100,000 which represents a fall of 96·8 per cent. In England and Wales, between 1911 and 1935, the death rate from abdominal tuberculosis for the pre-school age has fallen practically to the same extent, from 45 per 100,000 to 4·2 per 100,000, i.e. by 93 per cent. The improvement in this regard during the pre-school age becomes even more apparent when it is realized that in England and Wales in 1911, 25·2 per cent. of the deaths from tuberculosis were due to infection certified as of the abdomen, whereas in 1935 only 9·1 per cent. of the deaths were notified as resulting from disease situated in the abdomen. (*See* Table 1.)

TABLE 1.

Percentage of Deaths due to various types of Tuberculosis in Children of Pre-school Age (England and Wales).

Year	Pulmonary tuberculosis	Meningeal tuberculosis	General tuberculosis	Abdominal tuberculosis	Bone and Joint tuberculosis	Total
1911	19.0	41.0	1.0	25.2	13.0	99.2
1921	14.0	46.9	14.2	22.0	1.2	98.3
1929	16.8	51.1	15.7	14.0	1.5	99.1
1935	12.4	62.3	13.3	9.1	1.8	98.9
Difference between 1911 and 1935	-34.7%	+52%		-64%	-86.1%	

The above two varieties of the disease are of course for the most part due to the bovine type of the bacillus which, as already mentioned, has been most completely brought under control. Further, to judge by the recent official reports, these varieties of the disease should be still further eliminated, since it is stated that during the last six months the number of herds of cattle in Great Britain attested as being free from tuberculosis has risen from 208 to 464.

The varieties of tuberculosis most frequently encountered to-day, and especially during the pre-school age, are *pulmonary tuberculosis*, *general* and *miliary tuberculosis* with the sub-variety *meningitis*, and that large and important group particularly difficult to handle, viz. *latent tuberculosis*. This is clearly demonstrated in Table 1 giving the relative proportions of deaths from the various types of tuberculosis during the pre-school age. From this table it is seen that the pulmonary, meningeal and generalized forms account for 88 per cent. of the deaths. These are the types, too, which are in great part caused by the human strain of the organism. It is universally admitted that pulmonary tuberculosis is practically invariably caused by the human tubercle bacillus and, what is of equal importance, that not infrequently direct contact with some other infected individual can be traced. In the case of the child population it is one of the parents or other member of the family or perhaps some adult, such as a nurse entrusted with their care, who has transmitted the disease. Toussaint and MacIntyre⁶, in a recent survey of children dying from tuber-

culosis in the Metropolitan Borough of Bermondsey, found that in the case of six children who had suffered from pulmonary tuberculosis examination of the other members of the household revealed evidence of active pulmonary tuberculosis in four instances; the parents of the other two children would not permit examination of the other members of the family. In my own experience, of the last seventeen examples of pulmonary tuberculosis admitted to the Princess Elizabeth of York Hospital for Children under the care of either Dr. Chodak Gregory or myself, a history of concurrent and undoubted phthisis pulmonalis in the family was obtained in eight cases (46 per cent.) and of possible pulmonary tuberculosis in other three (17·6 per cent.).

Meningitis, which is now responsible for close on two-thirds (62·3 per cent.) of all tuberculous deaths during the pre-school age (Table 1), is also generally admitted to be as a rule due to the human type of organism. At least most records of the type of organism recovered from examples of tuberculous meningitis show that the bacillus is of the human variety in between 70 and 80 per cent. of the cases^{7, 8, 9, 10, 11}. Here again it would seem that the primary lesion, the *fons et origo* of the miliary spread and the meningeal involvement, is contracted through intimate contact with some other infected member of the household. Toussaint and MacIntyre,⁶ in their comprehensive investigation referred to above, found that in the case of forty-two examples of this manifestation of the disease, in which the parents permitted examination of the other members of the family, an active phthisis pulmonalis was discovered in thirty-six instances, i.e. 85·7 per cent. In my own experience evidence of a possible source of infection in the household was not obtained in anything like such a large proportion of cases, no doubt because reliance had to be placed entirely on the story of the mother of the child and it was not possible, as with Toussaint and MacIntyre, to submit all members of the household to a thorough physical examination. Of the last seventeen examples of tuberculous meningitis which have been under the care of either Dr. Chodak Gregory or myself at the Princess Elizabeth of York Hospital for Children

during the past six years, a history of active pulmonary tuberculosis in some other member of the family was only obtained in six, i.e. 35 per cent.

By analogy it would seem justifiable to ascribe the cause of many examples of the disease appearing in the death returns under the heading general tuberculosis to the human type of the organism, and hence also that they have been contracted in consequence of contact with the disease in the household. As already noted, this variety of the disease with the pulmonary and meningeal forms are responsible for 88 per cent. of the total tuberculosis deaths during the pre-school period of life.

PROPHYLAXIS

The above facts indicate the direction in which preventive measures should be applied if it is hoped to cause further diminution in the death rate and incidence of tuberculosis in childhood. There is no need to minimize the importance of a milk supply free of tubercle bacilli in the prevention of many child deaths and much child invalidism from tuberculosis, and everything should be done to bring about a total extinction of the bovine type of tuberculosis, but to-day it is the human variety of the disease which is causing greatest havoc. Although its elimination is a much more difficult problem than that of bovine tuberculosis, much could be done if the medical profession, and also the public, were more alive to the facts.

The association of children with infected adults would seem to be particularly dangerous. This may not be due, as is often assumed, to increased susceptibility but to the fact that their association with their parents and siblings is specially intimate. But whatever be the explanation, there would seem to be no doubt about the fact. Schuman¹², for example, records that of 730 phthisical adults contact could only be traced in 34 per cent. of the instances, but that in the case of forty-seven children contact with known tuberculous individuals could be demonstrated in 81 per cent. Schuman sheds further light on the great part which contact with adults with active disease plays in the etiology of tuberculosis in childhood, in his

report that of 220 infants and children exposed to cases with a positive sputum 70·9 per cent. reacted to tuberculin, whereas of 361 children associating only with non-tuberculous individuals or tuberculous individuals with a negative sputum, only 28 per cent. reacted to tuberculin. Hence it would seem imperative that all children should be removed from the households in which there is known active tuberculosis. It would be wise if we were to emulate the example of Sweden, France, and Canada in this respect, and perhaps also that of the two former countries in attempting at the same time to raise the resistance of the child by the use of the B.C.G. vaccine. It is by prevention that most lives can be saved from tuberculosis, and particularly pulmonary and meningeal tuberculosis. The latter is practically hopeless, and pulmonary tuberculosis is exceedingly fatal during childhood. It is computed that at least two-thirds of all children admitted to hospital with pulmonary tuberculosis die within a year.

LATENT TUBERCULOSIS

The largest group of cases of tuberculosis met with during the pre-school, or even the school age, is that which comprises those which come under the heading of *latent infection*. The only evidence of the disease is a positive tuberculin reaction (Pirquet or Mantoux) but they are potential cases of active tuberculosis and between them and those with a frank lesion in the lungs, abdomen, bone, glands, kidney or the generalized disease there are all gradations. Indeed, it is often a difficult matter to decide whether or not the tuberculous infection which the child is harbouring is active or latent. The child may simply be off colour, may not be increasing in weight as he ought to, and have ceased to present the natural exuberance of the normal healthy boy or girl.

It may be laid down as an axiom that the practitioner should overestimate rather than underestimate the probability of activity of the disease. It must also be remembered that the younger the child the more likely is the disease to be active, and hence particular care should be taken with those positive reactors who are of the pre-school age. It has been estimated that 37 per cent. of infants (i.e. under one year of age) reacting

positively to tuberculin die before they reach the age of three years, and that of children who react for the first time during the second and third years of life, 17 per cent. and 10 per cent. respectively die before they reach the age of five years. These facts, while revealing the seriousness of the infection during early life, at the same time give no little encouragement. If 63 per cent. of children infected during the first year, 80 per cent. of those infected during their second year, and 90 per cent. of those infected during their third year, survive for at least five years when no special precautions are taken, it is surely justifiable to hope that with proper care the mortality from this disease would become minimal and that the great majority would make complete recoveries.

In order that all due precautions may be taken it would seem wise to submit all children periodically, say every six months, to the intradermic tuberculin test (Mantoux's technique). If the child reacts positively, careful inquiry and examination of the other members of the household should be made to discover if there is a definite source of infection. If such is found, irrespective of the child's condition, he should be removed to some place of safety. The child himself must then be submitted to a thorough physical examination including X-ray examination of the chest. If there is X-ray evidence of disease within the thorax, the disease is almost certainly to be considered active. It may be here recalled that Blacklock¹³ in the course of the histological examination of 1,800 examples of fatal tuberculosis only found evidence of healing of a lung focus in three cases. Hence the child should be treated as a case of pulmonary or thoracic tuberculosis which implies residence in a sanatorium.

It is worth mentioning in passing that the skiagram alone may disclose the presence of an unsuspected miliary tuberculosis. This condition also calls for sanatorium treatment and, as previously mentioned, the recent recoveries reported from both miliary and pulmonary tuberculosis lend some promise of hope that our efforts may be crowned by success. Certainly if not so treated, not only will a fatal issue inevitably result but at the same time the case will form a focus for further spread

of the disease in the home.

If the physical and radiological examinations are negative, the child if under two or three years should still be considered as harbouring active disease and treated accordingly, i.e. residence under the most ideal conditions in the country or by the sea-side. If the child is over three years of age a watching brief may be held, and the child allowed to remain at home, if the conditions are satisfactory, and re-examined periodically.

CONCLUSIONS

(1) Pre-school age now ranks as the most dangerous period of childhood so far as tuberculosis is concerned.

(2) The large proportion of deaths from tuberculosis are consequent on the human type of infection.

(3) The chief method of attack is the avoidance of contact with known tuberculous individuals and the possible raising of the child's resistance by the use of B.C.G. vaccine.

(4) All children of pre-school age should be tested periodically by tuberculin—those reacting positively should be submitted to physical and radiological examination and, when evidence of disease is discovered, treated as examples of active tuberculosis.

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THE CARE AND TREATMENT OF INFLAMMATIONS OF THE NERVOUS SYSTEM IN THE PRE-SCHOOL CHILD

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FOR convenience, the inflammations of the nervous system likely to be met with in the pre-school child will be considered under three main headings: (1) Those affecting mainly the meninges—meningitis; (2) Those affecting the central nervous system—brain and spinal cord; (3) Those affecting the peripheral nerves—neuritis.

MENINGITIS

Early diagnosis is of paramount importance, as the earlier the presence of meningitis is recognized the more hopeful is the prognosis in those forms which are amenable to treatment. Conclusive diagnosis cannot be made by clinical examination alone; the question is rather what signs justify the suspicion of meningitis and demand the performance of lumbar puncture to confirm the diagnosis. A certain degree of neck rigidity is one of the earliest signs and is of cardinal importance. Kernig's sign is also of value in children above the age of two years and is present in fully 85 per cent. of cases. Other symptoms include pyrexia—often with a slowed or irregular pulse; headache; photophobia and general hyperæsthesia, the patient strongly resenting interference. With this clinical picture lumbar puncture and withdrawal of cerebrospinal fluid is essential both from a therapeutic standpoint to relieve intracranial tension and in order to identify the particular form of meningitis.

For practical purposes we may consider three main types of meningitis: (1) Acute suppurative meningitis; (2) Tuberculous meningitis; and (3) Cerebrospinal fever (meningococcal meningitis).

Acute suppurative meningitis.—This form of meningitis may be due to one of many organisms, the most frequent of which are:

(a) streptococcal; (b) pneumococcal; (c) staphylococcal; and (d) so-called influenzal meningitis due to Pfeiffer's bacillus. The streptococcal form is almost invariably secondary to otitis media, mastoiditis or infection in the accessory nasal sinuses. Both pneumococcal and influenzal meningitis may also be secondary to middle-ear or intranasal disease as well as to pneumonia. Occasionally either form may appear to be primary, no definite focus of infection being demonstrable. On lumbar puncture, the cerebrospinal fluid is seen to be turbid or yellowish and contains numerous polymorphonuclear cells together with the causal organism. Sugar is usually absent and the chlorides diminished.

In all forms of acute suppurative meningitis the prognosis is bad and most cases prove fatal.

Tuberculous meningitis is of less practical importance as, in spite of the fact that over 50 apparently authentic cases of recovery have been reported in the literature, the prognosis is universally considered to be hopeless. The greatest incidence of this form of meningitis occurs in the pre-school child and especially during the first three years of life. It is practically never a primary disease but is secondary to tuberculous infection in the lungs and mediastinal glands, in the intestine and mesenteric glands, or is part of a general miliary tuberculosis. The cerebrospinal fluid may be clear or slightly turbid to the naked eye; the cell content is increased and as a rule lymphocytes predominate, often up to 80 per cent. The chlorides are much diminished and protein increased.

Cerebrospinal fever (meningococcal meningitis) in the pre-school child is met with in two forms: (a) The posterior basic type, and (b) Ordinary acute cerebrospinal fever in older children.

(a) The posterior basic type is most often seen between the ages of four months and two and half years but may occur in children up to five years. The onset is usually sudden with screaming or convulsions, vomiting, and pyrexia. As the disease progresses, drowsiness develops and the child may lie quite motionless with open staring eyes. After the third or fourth day, pronounced head-retraction is present and the anterior

fontanelle bulges; the later stages are identical with the clinical picture of internal hydrocephalus. The course may continue for many weeks and even months. Less than 25 per cent. of cases recover and even then mental impairment, blindness, or deafness are frequent sequelæ.

At first lumbar puncture may yield a fair amount of cerebrospinal fluid containing meningococci and polymorph. cells. As the condition becomes more chronic, the fluid obtained is smaller in quantity, mononuclear cells tend to predominate and organisms cannot be found. If ventricular puncture be performed the fluid may be found to contain meningococci.

(b) The ordinary form of cerebrospinal fever in pre-school children differs little from that as seen in older children and adolescents, except that convulsions are more liable to occur early in the disease. The onset is usually acute with headache, vomiting and pyrexia, while neck rigidity and Kernig's sign are early manifestations. A petechial or purpuric rash is seen in about 40 per cent. of cases.

GENERAL TREATMENT OF MENINGITIS

General management.—The patient is confined to bed in a quiet and preferably semi-darkened room, the head kept low and sitting up not permitted. Unconscious and semi-conscious patients should be turned at intervals. In acute cases, milk, beef essences, cocoa, and lemonade are given. If vomiting is present, the milk should be diluted and citrated or peptonized. In cases recovering, semi-solids should be given as early as possible. Constipation is the general rule. Calomel or castor oil may be given at night followed by saline next morning. Liquid extract of cascara and compound liquorice powder are also useful, but enemas are frequently required. For headache, cold applications are beneficial and phenacetin with caffeine may be given twice daily.

Special treatment.—This consists in two principles: (1) The establishment of adequate drainage for the meningeal exudate; and (2) The application of a specific immune serum, if available, in as close contact as possible with the

inflamed tissues.

(1) *Adequate drainage* can usually be supplied by the performance of repeated daily lumbar puncture. More especially in cerebrospinal fever, my routine practice has been to follow a period of intrathecal serum administration by repeated daily lumbar puncture, with almost complete drainage of the subarachnoid space, until the cerebrospinal fluid becomes practically clear to the naked eye. With this method I have encountered no recrudescence or relapse. When no cerebrospinal fluid is obtained by lumbar puncture ("dry-tap") by reason of adhesions existing between the meninges and spinal cord at a higher level or owing to a progressive increase in the density of the purulent exudate, resort should be made to puncture of the cisterna magna or of the lateral ventricles.

In children with open fontanelles, puncture of the lateral ventricle is easy and may be resorted to at once if lumbar puncture fails to yield fluid. The needle is introduced at the lateral angle of the superior fontanelle, the direction being downwards, slightly backwards and inwards to a depth of 3 cm. In older children the usual method of draining the lateral ventricles is to trephine, a procedure which causes considerable "shock," especially as it is necessary to operate on both sides. This operation should not be considered unless the patient's condition is almost desperate.

More recently, instead of trephining I have merely drilled a hole through the skull over Keen's point and punctured the ventricle through the small opening thus made. In most cases it is possible to perform this operation without an anæsthetic; the "shock" is negligible as compared with that resulting from a trephine, and drainage appears equally effective. Cases of apparent internal hydrocephalus complicating meningococcal meningitis treated by this method have occasionally recovered.

(2) *Administration of serum*.—In order to exert its maximum effect, serum must be introduced directly into the subarachnoid space and must be renewed at intervals not exceeding 24 hours. When there is evidence of systematic

infection, the intrathecal medication should be supplemented by the intravenous administration of serum in doses up to 100 c.cm. Herrick, indeed, advises doses up to 600 c.cm., the resulting serum-sickness being stated to be no more severe than with smaller amounts. Anti-meningococcal, anti-pneumococcal, and anti-streptococcal sera are available for the respective forms of meningitis. The serum should be polyvalent for the specific organism obtained from the cerebrospinal fluid and is administered at the earliest possible moment. Later, if the actual type of organism is determined in the case of the meningococcus or pneumococcus, the corresponding univalent serum can be substituted.

Most observers agree that the intrathecal administration of serum remains the method of choice and that the lumbar route is preferable to the cisternal. Cistern puncture entails more risk—especially of hæmorrhage—even in skilled hands, and there is no evidence that serum is any more efficacious when given by this route. Also, the subarachnoid space cannot be so adequately drained as by lumbar puncture. The administration of serum in the lumbar region entails practically no risk, and it is known that solutions injected into the subarachnoid space by lumbar puncture penetrate readily into the chain of cerebral ventricles, reaching even to the tips of the lateral ventricles. In the case of cerebrospinal fever, some physicians prefer to give serum intravenously, either with or without intrathecal injection, especially during the first few days of illness and in cases showing a petechial rash.

In cerebrospinal fever, the initial dose of serum in the pre-school child is from 5 to 30 c.cm. followed by the same amount daily for at least four days, or until clinical improvement is definite. The quantity of serum injected should be at least 3 c.cm. less than that of the cerebrospinal fluid withdrawn. However great the patient's improvement may appear, serum injection should be continued until no more organisms are present in stained films of the cerebrospinal fluid deposit. After this period repeated daily lumbar puncture is advisable until the cerebrospinal fluid is almost clear to the naked eye. At each puncture the fluid is allowed to escape until the flow

practically ceases. Should signs of a recrudescence appear the injection of serum must be resumed; if the period since the last serum administration exceeds eight days anti-anaphylaxis must first be induced.

As regards acute suppurative meningitis secondary to otitis media and mastoiditis, an attempt should be made to remove the original septic focus and to establish full drainage of the subarachnoid space. In otitic meningitis, the trans-labyrinthine method of drainage has resulted in several recoveries.

The discovery that certain mono-azo dye substances possess bactericidal properties *in vivo* against streptococci has led to the introduction of a number of substances—the active principle of which appears to be *p*-aminobenzenesulphonamide or an allied substance—for therapeutic application to streptococcal infections. Encouraging results have been reported including recoveries from streptococcal meningitis. The remedies appear to be just as efficacious by the mouth as by injection. In the pre-school child suffering from streptococcal or staphylococcal meningitis, one tablet of prontosil or two tablets of sulphonamide-P (B.D.H.), for instance, can be given three times a day. At present this form of therapy seems likely to replace anti-streptococcal serum.

In pneumococcal meningitis, optochin (æthylhydrocupreine hydrochloride, 1 in 1,000 in normal saline)—which has a solvent action on pneumococci—may be given in combination with serum.

Acute lymphocytic meningitis (acute aseptic or serous meningitis).—This benign form of meningitis, first described by Wallgren in 1924, may occur sporadically in the pre-school child. It resembles other forms of meningitis in its onset and symptoms. The cerebrospinal fluid, however, is usually clear, but contains excess of lymphocytes up to 300 per c.cm. together with a normal chloride content. This latter finding distinguishes it from all other varieties of meningitis and especially from the tuberculous form. It is probably due to a filtrable virus. The prognosis is good and the disease often begins to subside following the first lumbar puncture. This procedure can be repeated in a few days if necessary.

INFLAMMATION OF THE BRAIN AND SPINAL CORD

A. EPIDEMIC ENCEPHALITIS

(Encephalitis Lethargica)

From 1917 to 1926 encephalitis lethargica in this country assumed epidemic proportions and sporadic cases continue to be met with. It occurs at all ages from the new-born child to the senile. In children, the majority of cases occur during school years, but many instances are seen in those of pre-school age. The causal organism, although not yet definitely identified, is almost certainly a specific filtrable virus resembling or closely related to that of herpes febrilis. It was formerly thought that the disease was an acute illness which, if recovery ensued, was liable to be followed by sequelæ. There is no doubt, however, that in reality it is a chronic disease which may or may not show an acute onset. Not infrequently the disease is entirely ambulatory from the first, the patient never having had to take to bed. In many cases, the onset resembles and is mistaken for an attack of influenza from which the patient recovers only to develop further manifestations of the malady at a later stage. Although a few cases recover completely from an acute attack, in most the disease is slowly but relentlessly progressive, while in others it may progress to a certain stage—even to the extent of a moderate or severe parkinsonism—and then become arrested.

When the onset is acute the patient complains of headache and malaise with some rise of temperature. In some instances the child passes into a drowsy or lethargic state but is usually capable of being roused to take food or answer questions. The stupor may pass into coma and death. Dysphagia and hiccough are not infrequent symptoms and more rarely convulsions may occur. In some cases there is a definite sleep reversal, the child being wakeful at night and drowsy during the daytime. This is always a suspicious circumstance, and I have known children, showing no other symptoms at the onset, develop parkinsonism within a year or two. A pyrexial stage may last anything from one to six weeks. During the earlier days of illness the cerebrospinal fluid

may show a slight increase in the number of lymphocytes and in the protein content, but these changes rapidly subside. The chlorides remain normal.

In ambulatory cases or at some time following a more or less acute onset, a chronic stage gradually sets in. The commonest manifestation, although less frequent in the pre-school child than in others, is that of parkinsonism, so termed on account of the clinical resemblance of the condition to paralysis agitans or Parkinson's disease. In most instances the parkinsonism gradually increases, although in a few it may remain stationary. A chronic and generalized parkinsonism never improves and it is frequently accompanied by excessive salivation.

A feature of the chronic stage of the disease in the pre-school child is the extraordinary changes in symptoms and signs that may occur from time to time. I have seen such instances, in which the onset occurred during the first year of life, show a series of manifestations, each succeeded by the other, including nystagmus, parkinsonian rigidity of one arm, athetosis of the same limb, generalized tremor and finally mild generalized parkinsonism. Among other occasional symptoms of the chronic stage of the disease in the pre-school child are nystagmus, optic atrophy (rare), oculogyric crises, athetosis, hemi-parkinsonism, disorders of respiratory rhythm (hyperpnœa and tachypnœa), obesity, and mental changes. As regard the latter, all types of deterioration, from a mere change of disposition to idiocy, may occur. The commonest type of mental disturbance is a behaviour disorder which may render the child almost uncontrollable or show itself in the form of some delinquency such as stealing.

In the acute stage, the general treatment is the same as that described for meningitis. Food should be given in adequate quantities and, if necessary, the patient should be fed with a cup or spoon. Owing to frequent difficulty and slowness in swallowing adequate time should be allowed. Although many drugs have been tried in the more acute stages, it is doubtful if any actually influence the disease.

The intravenous injection of sodium salicylate and mercuriochrome and the intramuscular injection of bismuth, mercury, antimony, and contramine, have all had their advocates. The treatment I have usually adopted has been the intravenous injection of colloidal iodine daily or every other day, with one injection of acetylarsan each week (in the pre-school child 4 to 10 c.cm. of collosol iodine and 1 c.cm. of "infantile" acetylarsan). In the chronic stage palliative treatment only is possible and for this purpose drugs of the solanaceous group are the most efficacious, especially in cases of parkinsonism.

In extensive trials on a large number of cases at the London County Council Post-Encephalitis Unit, carried out in conjunction with T. R. Hill, the conclusion was reached that stramonium, when given in appropriate dosage by the mouth, was far superior to either belladonna, pure atropine, daturine, hyoscine or hyoscyamine. Starting with a small dose the medicament is rapidly worked up to the limit of tolerance. Considerable improvement results, especially in the range and rate of movement owing to relative relaxation of the hypertonic muscles, in the control of tremors, salivation and oculo-gyric crises. Under the influence of stramonium, patients scarcely able to walk become able to feed and dress themselves quite well and excessive salivation is controlled. For convenience and to avoid the necessity in some cases of administering a fair quantity of alcohol in the form of tincture, we have prescribed the stramonium in the form of the extract stramonii of the United States Pharmacopœia. We have described elsewhere this method of treatment.¹ In most pre-school children, however, treatment is best begun by means of gradually increasing doses of the tincture of stramonium, for which purpose that of B.P. 1914 appears superior to that of B.P. 1932, even when allowance is made for the difference in concentration.

B. ENCEPHALO-MYELITIS

(*Encephalitis following the Exanthemata and Vaccinial Encephalitis*). This inflammation of the central nervous system is a rare

complication of the acute specific fevers, especially measles, chicken-pox and mumps, and occasionally of diphtheria, scarlet fever, and even whooping-cough. Some cases have also followed vaccination while other cases arise spontaneously.

Whether following a specific fever or vaccination, the clinical picture and also, as far as we know, the pathological findings, are identical in all forms. It would appear that the disease is due to a virus and that the specific fever or vaccination in younger children serves as an "activator," that is, by lowering the resistance of the patient and allowing the virus to obtain a foothold in the system.

The initial symptoms consist of pyrexia, headache, drowsiness, and occasionally vomiting. There may be some pain and stiffness in the neck and spine. The drowsiness may pass into coma and towards a fatal issue, or gradual improvement may set in after two or three weeks. The nervous symptoms during the illness include oculomotor palsies, tremors and weakness or paresis of one or more of the limbs. The deep reflexes are often increased and the plantar reflexes extensor. In the acute stage the cerebrospinal fluid is clear, but may show an increase in the protein content and in the number of lymphocytes. The disease is self-limiting and the majority of cases recover within a few weeks. The mortality is somewhat heavier in the post-vaccinal type. Sequelæ may occur in the form of a persistent squint or a mild spastic weakness of one or more of the limbs.

Treatment is mainly symptomatic and on the general lines for acute disease of the nervous system such as meningitis. As regards more specific treatment, rapid improvement has been reported in the post-vaccinal group following the intrathecal injection of 5 c.cm. of serum obtained from a recently vaccinated child. Similarly, equally good results are recorded in measles encephalitis following the administration of convalescent measles-serum given intramuscularly, intravenously or intrathecally.

C. POLIOMYELITIS AND POLIO-ENCEPHALITIS

An acute infection of the central nervous system due to a

filtrable virus and which shows an almost special affinity for the motor cells of the brain and spinal cord (cranial-nerve motor nuclei and anterior horn cells of the spinal cord). Clinically, the disease is characterized by the development of paralyses of a lower motor neurone type.

The initial or pre-paralytic stage, which lasts only a few days, consists mainly of pyrexia, malaise, and nasopharyngeal catarrh. Headache, vomiting and muscular pain are not infrequent. Occasionally the initial stage is succeeded by a condition of "meningism," the clinical aspect resembling meningitis, with some neck rigidity and Kernig's sign. More rarely definite meningitic signs are present from the outset with some headache, general tenderness, head retraction, and photophobia. In such cases the cerebrospinal fluid will be found clear to the naked eye but will show an increase in the number of lymphocytes to between 50 to 300 per c.mm., with an occasional polymorphonuclear cell. The protein is slightly increased but the important finding is that the chlorides are normal, which serves to differentiate the condition from tuberculous meningitis.

In the spinal type, paralysis of one or more limbs appears within a few days of the onset, or in many cases in which the pre-paralytic stage is so slight as to be overlooked, paralysis is the first manifestation. Within about two weeks some of the affected muscles begin to improve and the paralysis which may at first have been widespread, becomes localized to one limb, a group of muscles or even a single muscle. This may be termed the "residual paralysis." Atrophy of these muscles gradually becomes more pronounced.

In the cerebral type (polio-encephalitis), which is rare in comparison with the spinal type, the motor cells of the brain are involved. The onset is acute, often with convulsions succeeded by coma. If the case does not prove fatal, the coma may pass off within a few days and a spastic hemiplegia or monoplegia of the upper neurone type be apparent. This form is sometimes termed "polio-encephalitis superior" to distinguish it from "polio-encephalitis inferior" in which the motor nuclei of the brain stem are involved, giving rise to

oculomotor palsies or paralysis of the facial muscles or those of mastication and deglutition. Either of these forms may be combined with the spinal type giving rise to "polio-encephalomyelitis."

In the spinal type a fatal result is only anticipated when the respiratory muscles or bulbar nuclei become involved. The actual mortality is low and only rises as high as 10 per cent. during epidemics.

During the acute stage the general treatment is the same as for meningitis. Relief from headache and alleviation of restlessness may be afforded by the initial lumbar puncture. Paralysed muscles should be immobilized by placing the affected limbs between sandbags. When pain and tenderness has disappeared, light celluloid or poroplastic splints may be applied, care being taken to keep paralysed muscles in a state of relaxation and a limb or limbs in a position appropriate to avoid contractures, no joint being allowed to remain in full flexion or in full extension. It may be confidently stated that, in any given case, much of the initial paralysis will disappear but that one or more groups of muscles will remain paralysed and wasted in proportion to the original extent of the paralysis. In a few of the milder cases, recovery is complete.

After two or three weeks, light massage, and passive movements may be instituted for the paralysed muscles and, later, galvanic stimulation applied. For any muscles showing voluntary movement, mild exercises can then be started. Improvement in the affected muscles is possible up to six or nine months from the onset, but muscles which still continue to show no voluntary movement and a reaction to degeneration on electrical testing are likely to remain paralysed. In muscles which, although wasted, show any degree of voluntary movement, it is possible for slow improvement to continue for eighteen months or two years. Orthopædic measures may be necessary when no further improvement appears likely.

The question of the efficacy or otherwise of serum treatment is still *sub judice*. As long ago as 1910, Flexner and Lewis

showed that the serum of patients convalescent from an attack of poliomyelitis contained antibodies which could prevent the development of paralysis in animals which had received an inoculation of the virus. Several workers have reported encouraging results following the application of convalescent serum, but to be effective it must be administered during the pre-paralytic stage of the disease. The serum is given intrathecally in doses of 10 to 30 c.cm. and the same amount intravenously.

D. CHOREA

(Sydenham's or Rheumatic Chorea)

Chorea is rare in the pre-school child and most cases occur in children over the age of five years. The disease has been recorded, however, in a child of ten months (Poynton) and in many of three or four years. Owing to its association with other forms of acute rheumatism, chorea is now generally accepted as a mild rheumatic meningo-encephalitis.

Although opinions differ greatly regarding many aspects of the treatment of chorea, all agree as to the necessity for complete and absolute rest in bed. The danger of carditis must be continually borne in mind. The child should be kept as flat as possible and not allowed to feed himself, food being administered by the nurse for the first few weeks. Although quiet is essential, the patient need not be isolated. The various drugs that have been advocated in chorea from time to time include salicylates, arsenic, bromides, chloral, chloretone, phenazone, and nirvanol. It is at least rational in a presumably rheumatic infection to prescribe a salicylate—even if it does not inhibit the development of carditis—and for this purpose acetylsalicylic acid in doses of 5 gr. three times daily appears the best. When the movements are severe and exhausting, sedatives are indicated and 5 to 7 gr. of potassium bromide three times a day is as good as anything else. For sleep, if necessary, chloral (5 gr.) in syrup is useful. Although the barbiturate nirvanol appears in some cases to shorten the course of the disease as regards choreic movements, it gives rise to a rash, frequently to pyrexia, and occasionally to mental

confusion. It should certainly not be used in the pre-school child. A method of treatment that has also been advocated is the intrathecal injection of convalescent-chorea serum which is of very doubtful value and is needlessly drastic.

Choreic movements usually begin to subside in the fourth or fifth week of illness when the child may be allowed to play with toys. If movements have completely disappeared and in the absence of carditis, the patient may be allowed up after six or seven weeks.

E. MYELITIS

Myelitis is rare in the pre-school child but may arise spontaneously or follow one of the exanthemata. The onset may be acute or subacute with pyrexia and pain in the back. A paraplegia develops with loss of sensation up to a particular level and loss of sphincter control. At first the legs are usually flaccid but may tend to become spastic later. Most cases eventually prove fatal—usually from infection of the urinary tract—but if mild, the patient may recover with some residual spastic paraplegia. There is no special treatment but every care must be taken to avoid infection of the bladder and to treat this as far as possible should it occur.

* * *

The treatment of the various complications of otitis media, extradural abscess, lateral sinus thrombosis, and cerebral abscess—come within the realm of the aural and cerebral surgeon.

PERIPHERAL NEURITIS

Apart from that following diphtheria, peripheral neuritis is rare in the pre-school child. Lead neuritis has been described in children as the result of sucking toys painted with lead paint. Arsenical neuritis has occurred in cases of chorea as a result of over-dosage with arsenic, and even alcoholic neuritis has been recorded. Peripheral neuritis is also a rare complication of the exanthemata.

Polyneuritica endemica (beri-beri) is a multiple neuritis resulting from a deficiency of vitamin B₁ (vitamin F) in the

diet. It is treated by administering the missing vitamin in the form of milk, eggs, barley, yeast and marmite.

Diphtheritic neuritis.—This is the commonest form of peripheral neuritis in children. It is most frequent during the second or third week after diphtheria but may occur as late as the eighth week. J. D. Rolleston has shown that diphtheric antitoxin has an inhibitory effect upon the development of neuritis. Consequently most cases follow a mild and unrecognized infection when antitoxin has not been given. The symptoms include paralysis of the palate with nasal intonation and occasionally dysphagia. Paralysis of accommodation is often seen but ocular palsies are rare. Unsteadiness and inco-ordination of gait, owing to weakness of the limbs, with absence of the deep reflexes is frequent, but no muscular wasting or sensory loss occurs. The prognosis depends upon the state of the heart, as myocardial weakness is often present and cardiac failure may occur suddenly. Tachycardia is frequent and pallor and vomiting rather ominous signs. The child must be kept in bed and not allowed to sit up. The diet should be light and thickened fluids given if palatal paralysis renders it difficult for the patient to swallow simple fluids. In dysphagia, the nasal or œsophageal tube may be necessary. During the acute stage 5 minims of adrenaline hypodermically with strychnine (1/100 gr.) is advocated by Sheldon, as well as atropine (1/200 gr.) every four hours. Antitoxin has no effect on the actual neuritis or paralysis.

Mild cases recover in a few weeks, but as a general rule a child should not be allowed up until the heart condition is satisfactory, especially as regards the quality of the first sound, and the pulse rate has become normal.

ERYTHRŒDEMA POLYNEURITICA

(*Pink Disease*)

A disease of young children characterized by irritability, pinkness of the extremities, and sensory, motor and trophic disturbances. It was first described by Swift in Australia in 1914. The majority of cases occur between the ages of six

months and two years; the disease is very rare after the age of seven years. The cause is not known but appears to be either an infection or vitamin deficiency.

The onset may occur with a broncho-nasal catarrh, followed by the gradual development of the more characteristic signs—restlessness; photophobia; anorexia; a pink-red colour and slightly swollen appearance, without actual œdema, of the hands, feet and occasionally the nose and ears; sweating and a tendency to whitlows; tingling and numbness of the extremities; occasional anæsthesia; stomatitis and muscular hypotonia. The deep reflexes are diminished or absent. The disease may run an intermittent course of several weeks or even months and terminate in complete recovery. The mortality is comparatively low—about five per cent. Broncho-pneumonia and cardiac failure are the more serious complications.

Treatment is mainly symptomatic, there being no specific remedy. The hands and feet should be protected by cotton gloves and stockings and the diet should contain an adequate amount of vitamins—including marmite. Liver has been advocated by Wyllie and Stern and is worthy of further trial. For the skin condition, lotio calaminæ can be applied. If sleeplessness occurs chloral is probably the best remedy. Anorexia is often so intense that even coaxing and feeding with a spoon may be in effective. Hobhouse advises the early and repeated use of the nasal tube.

Reference

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THE DIAGNOSIS AND TREATMENT OF CONGENITAL DEFORMITIES IN YOUNG CHILDREN

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THE ideal to which motherhood aspires is the perfect child, and the slightest deviation from the normal gives rise to much anxiety. Hence the importance to the general practitioner of a knowledge of the orthopædic disabilities likely to occur in infants and young children. He must therefore always be on the watch and methodically and scientifically re-examine young children, especially those born under difficulties, and in particular by the breech.

The following are therefore given as some of the congenital and acquired deformities for which the medical practitioner should be on the look-out:—

(A) *CONGENITAL*.—(1) Dislocation of hip; (2) Talipes; (3) Torticollis; (4) Spastic paralyses; (5) Webbed digits; (6) Sprengel's shoulder.

(B) *ACQUIRED*.—(1) Erb's paralysis; (2) Fractures; (3) Infections of bones and joints; (4) Poliomyelitis; (5) Flat foot; (6) Rickets.

A. CONGENITAL LESIONS

CONGENITAL DISLOCATION OF THE HIP

This condition occurs almost invariably in breech presentations, and nearly always in a girl. Hence the necessity of careful supervision and after-care by the midwife and practitioner of any infant born by the breech. The *diagnosis* is not always easy, especially in infants. The earliest sign in a patient under a year is slight shortening on the affected side; looseness of the joint, with limitation of abduction, and tightness of the adductors in the groin. Later a prominence of the buttock on standing, and a limp on walking, are sufficient clinical evidence of a dislocation. The diagnosis is confirmed when

X-ray films show the head of the femur to be outside the vertical, either at the level of or above the acetabular margin.

Treatment.—The earlier the diagnosis the sooner can the treatment be carried out, and the simpler will be its detail. In infants both hips should be bandaged in abduction in the

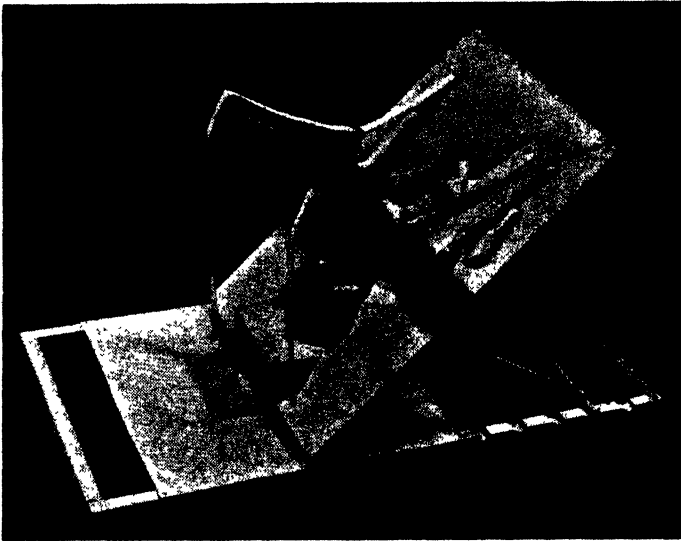


FIG. 1.—Photograph showing the special frame used in the treatment of congenital dislocation of the hips.

Forrester Brown modification of Putti's Splint. In little children up to about the age of five years the dislocation must be reduced under a general anæsthetic, and the reduction maintained in plaster of Paris. As soon as possible the child should be encouraged to walk in the plaster. Infants treated in plaster in the "frog" position should be placed in the Fowler position on a specially designed racked frame, with food and play table attached, to prevent soiling of the plaster and urinary infection. Prolonged treatment in the dorsal decubitus is thus avoided, good action of the heart is maintained, and full action of the lungs. Since the invention of this frame I have had no complications in the nursing of the patient, and when the time is ripe the patient is muscular and ready to learn to walk, especially if a type of "kiddy-car" be used as an intermediate instrument of progression, the child "swimming" about on it lying on the abdomen.

The *prognosis* in such cases is good—a complete cure in infants treated early in the Putti splint; and, in later cases, the percentage of cures is seventy-five in single, and fifty in double dislocations. Should it be impossible to reduce the dislocation by the above methods then open operation is essential in properly selected cases. The operation is a difficult one, and requires the assistance of a skilful anæsthetist, and blood should be available for a transfusion. It cannot be emphasized too strongly that congenital dislocation of the hip is preventable, and that throughout the treatment the case should remain under the closest supervision of the orthopædic surgeon.

TALIPES OR CLUB FOOT

Congenital club foot is a rare deformity, and almost invariably due to moulding in utero, the common type being talipes equino-varus, when the foot is pointed downwards and inwards, with contraction of the tendons on the side of the deformity. Treatment should be commenced from the moment of birth, the foot being unravelled by peaceful persuasion, but any method of splintage may be employed in which continuity of treatment can be carried out conscientiously by the same team of workers. Once the deformity has been corrected, re-education of the opposite groups of muscles must be encouraged. I prefer treatment by malleable iron splints, well padded with jaconet, on the one side, which should be applied to the outer side of the leg and foot on the top of a thin layer of cotton-wool or gamgee, which has first been partially bandaged to the leg. This splint is reapplied daily, the outer portion being bent slightly outwards, and the foot coaxed to follow it by bandaging from above downwards, and from within outwards, due care being taken of the circulation. This treatment is continued until full eversion is obtained by tickling the sole of the foot. Treatment of the equinus deformity then follows—a malleable iron splint being applied to the calf and sole of the foot in a position a few degrees more dorsiflexed than the foot itself, thereby stretching the tendo Achillis. The angle of the splint is adjusted periodically, until the foot is well dorsiflexed, and can be

maintained in this position by cutaneous stimulation. If the above line of treatment is successful, no operation is needed.



FIG. 2.—Three photographs of a case of club foot; the first before treatment, and the second and third after two months' treatment by the simple splints described in the text.

If, however, the case is resistant, and the tendo Achillis is still contracted at the end of the ninth month, it may then be necessary to apply plaster of Paris, under an anæsthetic, thereby stretching the tendon, or, in more severe cases actually to divide the tendon subcutaneously. After the deformity has been corrected, the child should be supplied with boots, wedged on the outer side, and "floated" outwards, which should be worn as long as there is the slightest tendency to relapse on the removal of body weight in standing or walking. In some instances, however, relapse takes place, and it is often found on X-ray examination that the bones of the foot, particularly of the tarsus, are slightly abnormal in shape, a condition which can be suspected on clinical examination, if there appears to be a cartilaginous or bony block to correction of the deformity with the fingers. Such cases are best dealt with by arthrodesis of those joints at which the obstruction occurs, but in no instance should such an operation be carried out in children under five years of age, since the amount of bone available for such a procedure is small, and relapse is liable to occur. In all cases treated by such an operation, specially made boots should be worn for a considerable time afterwards.

Prognosis.—The treatment of club foot is excellent in those cases seen early, but diminishes when seen at a later date, particularly if they have been allowed to stand or walk in the deformed position. The key-note to success is early treatment, loyally carried out by the same orthopædic team, of which the mother and nurse are most important members.

TORTICOLLIS

Torticollis or wry neck is a rare deformity, associated with a breech presentation, or a difficult forceps delivery. Shortly after birth a thickening is noticed in the body of the sternomastoid muscle at or below its centre. This is the so-called hæmatoma, massage of which almost always cures the condition within three to four months. Only in a small percentage of cases, seen early, is there a permanent residual deformity.

The surgical *treatment* is division of the tendon of the sternomastoid, either by the open or subcutaneous method. The latter should be preferred. The operation is a major one, requiring skilled anæsthesia and assistance. A full set of instruments should always be available, in case a large blood vessel should be injured during the tenotomy and necessitate ligation. The head is kept in the corrected position by the application of a plaster jacket. This is removed at the end of four weeks and active exercises taught by the orthopædic masseuse.

The results are excellent, within three to twelve months, depending upon the age of the patient and the severity of the deformity. The youngest patient operated upon by this method is eighteen months, and the oldest thirty-one years. The cosmetic result, with a fine pin-prick scar, is of great psychological momentum to the patient, particularly in women.

SPASTIC PARALYSIS

Infants developing such a paralysis are often premature, or the subject of difficult labour, or forceps delivery, or in some instances are of syphilitic taint. A Wassermann reaction should therefore be taken in all cases of spastic paralysis. There are several types of the deformity—spasticity of one side—hemiplegia; of both lower limbs—diplegia; or of all four limbs—tetraplegia. These cases are not of necessity diagnosed at birth. But after a few weeks or months the nurse may notice an increasing hardness of the muscles, and stiffness of the joints.

In *hemiplegia* the hand and digits, especially the thumb, are often flexed, the forearm pronated, and the upper arm abducted from the side of the body by a spasm of the deltoid.

The lower limb is adducted, with perhaps slight flexion of the knee, and a definite contraction of the tendo Achillis. In *diplegia* the lower limbs are alone affected, with the typical scissor-like gait. In *tetraplegia* all four limbs are affected, there are mental changes, and it is seldom possible to treat the case surgically. However, each case should be treated on its merits.

Treatment.—The ideal is to secure a dorsiflexed hand, a supinated forearm, and planti-grade foot. In the upper limbs these are obtained by operating upon the nerve supply to the spastic groups of muscles and thereby diminishing the spasticity. This is known as Stoffel's operation, which is of great value in carefully selected cases. In deltoid spasm the circumflex nerve is attacked; and in flexor spasm the median nerve. In the case of the lower limbs, the tendo Achillis is elongated, and the foot put into plaster, and the tendons of the adductors divided, the patient being nursed in abduction for six weeks. Later the orthopædic masseuse re-educates the upper limb in the direction of dorsiflexion and supination, and the lower limb in walking. Much patience is required, but is soon rewarded by the increased interest taken by the patient in his surroundings so that eventually he need not be backward at school, and may even take part in modified guarded games.

The *prognosis* in selected cases is excellent, particularly if the operations can be carried out at a fairly early age, say five years, before the child has had a chance to acquire bad or lazy habits, and before marked contracture has occurred. But it should be pointed out that any fits must be minor in type, not increasing in severity or frequency, and well under the control of bromides and other drugs. Further, there must be little or no incontinence of urine and fæces. Athetosis is not of itself a contra-indication to operation.

WEBBED DIGITS

These are rare deformities, especially in the feet. Should supernumerary digits be associated with this abnormality, then they should be removed at an early date. On the other hand no plastic operation should be carried out on the webs until the hand or foot is large enough to supply sufficient tissue for

that purpose. Five years is probably the youngest age at which such an operation should be carried out. The simplest plastic procedure should be performed, with pinch grafts if necessary, and the hand immobilized in a modification of the Forrester Brown-Baldwin cock-up splint, the digits being distracted and abducted by Limerick hook or Brock safety pin through the pulp of the affected digits. An Esmarch bandage should not be used during the operation, nor should any dressing be applied to the wounds or graft. In view of the definite fact that the deformity is hereditary the parents should be warned accordingly.

SPRENGEL'S SHOULDER

Sprengel's shoulder is a rare congenital deformity in which one shoulder is higher than the other. In rarer cases both shoulders are involved, with a corresponding shortening of the neck as a whole. This condition was actually first described by an Englishman, Walsham, of St. Bartholomew's Hospital, in 1880, some years before Sprengel's description appeared on the Continent. As a rule, the first indication of the deformity is stiffening of the shoulder; limitation of range, especially of abduction and forward flexion, which is accompanied by marked winging of the scapula. In rarer cases the scapula is actually tethered to the cervical vertebræ by bands of fibrous tissue, muscle, or even bone (the so-called omo-cervical bone). X-ray photographs are essential, as these may show the presence of other congenital abnormalities, such as irregular segmentation of the vertebræ or cervical ribs. Such cases should be operated upon at an early date, before ossification takes place, if possible, before the age of three to five years. The results at such an age are fully justified, but later, bony and muscular shortening result in permanent deformity.

B. ACQUIRED LESIONS

ERB'S PARALYSIS

This type of paralysis is recognized immediately after birth as "shoulder drop," the muscles of the shoulder girdle, especially the deltoid, being flaccid with little or no action of the muscles on stimulation of the skin of the axilla or hand. In

more severe cases, there is, in addition, partial or complete paralysis of the fore-arm and hand. Such paralysis are invariably associated with a difficult labour, often a breech presentation, with difficulty in delivery. Occasionally the paralysis may be associated with a fracture of the humerus or clavicle. In rarer cases a hæmatoma of the sternomastoid muscle may occur, this being on the same side of the paralysed shoulder. The cause of the paralysis is injury to the brachial plexus, especially the fifth and sixth cervical.

The *prognosis* is favourable in deltoid paralysis, provided the case is seen early and splinted adequately, a cure being effected within three to six months. In infants with more extensive paralysis, treatment must be prolonged even for six to eighteen months, and, even then, a complete cure is not always obtained. Additional treatment in the form of massage and re-education is essential, especially the latter. Electricity is of little value, and operation on the brachial plexus is contra-indicated. At a later stage, say, from five to ten years of age, operations on bones and tendons may be necessary, in cases of residual deformities or paralysis. This is particularly the case in the deformity of internal rotation and abduction of the shaft of the humerus, the hand thereby being held awkwardly in the "waiter's position." Such a deformity is treated by a rotation-osteotomy of the upper end of the shaft of the humerus, the lower fragment being externally rotated and adducted to cure the above mentioned deformities, the result being of great cosmetic value, particularly with the feminine sex.

FRACTURES

Fractures in little children are rare and may be congenital or acquired. Congenital fractures are probably traumatic at birth and usually in the lower third of the tibia, the shaft of the femur, or the shaft of the humerus. Non-union is often present in the tibia, is extremely resistant to treatment, and is not always cured by bone graft, such an operation being undertaken only after all the orthodox simple methods have been tried. Such an operation should not be carried out until the patient is between five and ten years of age, and, even then,

may not be successful, so that amputation of the limb may eventually be necessary. Fractures of the femur and humerus at, or just after birth, can be treated on a small Thomas's splint, or, in the case of the femur, suspended on a Bryant's frame. Union is generally complete, in such cases, at the end of the third week, and in no instance should the treatment interfere with breast feeding.

Of acquired fractures, that at the elbow joint is the most common, particularly above the epiphysial line, due to a fall on the outstretched hand. After reduction of the fracture by hyperextension, distraction, and flexion, the elbow joint should be kept flexed by the collar and cuff method for two or three weeks, due attention being paid to the radial pulse and nerve supply of the hand.

The dangers of the fracture at the elbow are traumatic myositis ossificans, and Volkmann's ischæmic paralysis. In Volkmann's ischæmic paralysis there is a rapid swelling of the hand and fingers, with inability to use them. The treatment should be immediate, any hæmatoma being evacuated, the limb being kept flexed at about 90° or until the pulsation of the radial artery returns, radiant heat and massage being employed as soon as possible. Should *main-en-griffe* occur, then it should be corrected by the splintage methods of Sir Robert Jones. Such cases are of extreme medico-legal importance, particularly as such paralysis may come on before any surgical treatment has been instituted.

Greenstick fractures are easily reduced, and immobilized in simple plaster splints, and even if seen late seldom require treatment for any deformity that may be present since this is generally corrected by nature herself in course of time.

Separation of the epiphysis of the upper end of the femur seldom occurs in children under five, but is recognized by a limp with external rotation of the limb. The diagnosis is confirmed by X-ray films, and the fracture reduced, and kept in internal rotation in a Thomas's splint until union is sound.

INFECTIONS OF BONES AND JOINTS

A. BONES.—I. *Osteomyelitis* is a serious infection of bone, generally with the staphylococcus, in which the life of the

child may be endangered from septicæmia. It may occur in the epiphysis or metaphysis, and spread to a neighbouring joint. The *treatment* is early drainage only, when the infection is localized. Later, if necessary, sequestra may have to be removed. Removal of the diaphysis is an operation to be condemned.

2. *Brodie's abscess*.—This occurs in the shaft of the long bones, generally of the lower limbs, and is due to blood-borne staphylococcal infection. Often children heal these themselves, without the assistance of the surgeon. Should the abscess increase in size, and cause pain and rise of temperature, it should then be drained, the lining of the cavity cleared out, and smeared with a very small amount of antiseptic such as "bipp."

3. *Dactylitis*.—Extensive deformity can occur in the fingers and their joints unless drained carefully and kept distracted on a special splint for a prolonged period of time.

B. *JOINTS*.—Limp is noticed early, with or without pain and pyrexia. If due to acute infection with the staphylococcus or pneumococcus, immediate drainage with distraction and early movement is essential. As a rule a stable and moveable joint is ultimately obtained. If tuberculosis be the cause, prolonged rest for years in the open air is necessary, for nature to form a stiff painless joint. Should ankylosis not occur, and this is by means uncommon, an operation should be performed to effect this surgically.

LIMP.—A limp in little children should be regarded as a serious matter, as it may be the earliest sign of tuberculosis of the hip or knee joint. If intermittent and painless the cause may be "false tubercle," or pseudocoxalgia. If persistent and painful, then true tubercle is the cause. X-ray films will establish the differential diagnosis.

The *treatment* in either case is prolonged immobilization of the joint, with the maximum amount of fresh air, sunlight, and good food. It cannot be stressed too emphatically and too often that the presence of tuberculosis in a joint is a sure sign of a similar infection elsewhere in the body, and the treatment must also be of the body as a whole, as well as of the affected joint. For these reasons the duration of treatment may

extend over several years in order to get an ankylosis of the joint. Should nature fail to secure this, it should then be obtained surgically in carefully selected cases in good health and of the right age. The operation should not be performed in children under five.

Kohler's disease.—The scaphoid bone of the foot is diseased, proved by X-ray examination, resulting in a painful stiff and œdematous flat foot. Correction of the deformity and immobilization in plaster of Paris generally cures the condition in three to twelve months. A wedged boot or shoe should be worn for some time after the plaster has been removed. The condition is rare, especially in children under five.

ACUTE POLIOMYELITIS

This is a most serious infectious disease, attacking children and young adults, generally in the height of the summer and throughout the autumn. The onset is sudden pyrexia, headache, pain in the neck and muscles, and rapidly increasing paralysis. At first the deformities are flail, with shoulder and foot drop. Later if partial recovery occur they are obviously due to over action of the unopposed muscles.

In the early stages the *diagnosis* is difficult, the pyrexia and muscle pains being suggestive of influenza or the acute specific fevers. Later the neck pain, head retraction, paralysis, and change in cerebrospinal fluid make the diagnosis quite clear.

Team work is essential in the *treatment* of such a tragedy—the pathologist relieving cerebrospinal tension by lumbar puncture, and by the injection of serum if available within the first twenty-four to forty-eight hours of the onset of the disease. The orthopædic surgeon must at once immobilize the paralysed muscles in the orthodox positions necessary for optimum utility after the acute stage has passed. These are in the main as follows: the spine and neck horizontal; the shoulder abducted, the elbow flexed at ninety degrees, the wrist dorsiflexed, and the thumb in opposition; the hip extended, abducted, and slightly internally rotated, with the knee straight, and the foot at a right angle slightly inverted. Such relaxation is best carried out by the use of plaster of

Paris, and the effect is instantaneous, and remarkable, the patient becoming mentally calm, with no pyrexia, and no pain, being thereby enabled to sleep for long periods. Treatment must be supplemented by massage and re-education in suitable cases, for a varying period of time, depending upon the rate of recovery, and the groups of muscles affected. In no case should the treatment be discontinued until at least two years have passed since the onset of the disease.

In severe cases of the ascending, and fulminating type, a Drinker's respirator may save life. In residual paralysis, the child may be allowed up, provided the lower limbs are supported by the necessary callipers and special boots, and the upper limbs by abduction splints. Needless to say the spine must also be protected by a simple spinal brace.

Later, residual deformities must be corrected or stabilized, by operations on tendon or bone, but it is seldom wise to carry these out before the age of five. The operations of proved value are: arthrodesis of the shoulder in the flail type of deformity; tendon transplantation in certain cases of weak wrist, arthrodesis in other types of weak wrist, transposition of the flexor longus pollicis in certain types of opponens paralysis, and a bone block or an arthrodesis in certain types of flail foot.

FLAT FOOT

The feet of most infants are flat at birth, and remain so for some months, but eventually become normal, as their muscular power develops. A certain proportion, however, require treatment in the later months of infancy, as they attempt to stand and walk, especially if there be a history of rickets. The *treatment* is simple: to wear anatomical shoes, well fitting and of good leather, to which have been added wedges to the inner side of the sole and heel. Should the flat foot be of a more severe type, then boots should be worn, with wedges, and, if necessary, a pad and stiffening of the boot on the inner side. Such altered footgear should be worn until the feet are muscular, do not tire easily, and are well arched on voluntary inversion. Exercises for flat foot are seldom necessary or possible in little children, owing to lack

of concentration in their performance. Severe degrees of flat foot are rare in little children, except of the congenital or paralytic type. When they occur splintage, manipulation, or

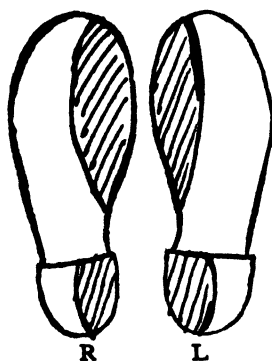


FIG. 3.—Diagram of wedges inserted for simple cases of flat foot.

plaster of Paris may then be necessary, followed by the routine treatment described above.

The very definite increase in the number of bunions occurring in young adolescent girls should be quoted as a warning to parents to see that in childhood and adolescence all foot gear is anatomical in shape and well fitting, and that socks and stockings are not too tight from over shrinkage or lack of elasticity in the material of which they are made.

RACHITIC DEFORMITIES

It is a melancholy fact that rickets is still a prevalent disease, and is the cause of bowed tibiae and femora, coxa vara and kyphosis. The *treatment* is dietetic and postural. In the latter, weight is taken off the limbs, and the deformities splinted, and occasionally operated upon.

DISORDERS OF THE SKIN IN THE PRE-SCHOOL CHILD

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NO part of dermatology is peculiar to the pre-school age, in which period the child is still relatively protected but at the same time, through older playmates, is exposed to whatever infections are prevalent in the schools. Impetigo and ring-worm have to be considered here and in addition the child brings its unresolved skin troubles of infancy, congenital or acquired. The congenital disorders include birth-marks or *nævi*, xerodermia, ichthyosis, epidermolysis bullosa and abnormalities of the hair. Common acquired conditions of these ages are:—eczema, seborrhœa, urticaria, and scabies.

Most of the above-mentioned disorders are well known and it is unnecessary to deal systematically with them. Instead, it is proposed to comment on those points which have some special interest or which appear to cause difficulty in general practice.

BIRTH-MARKS

Birth-marks call for a great deal of skill and patience if good cosmetic results are to be ensured. In the majority of *nævi* the skin has a very distorted pattern and no treatment to such a mark can restore a normal texture; only expert skin-grafting will do that. Parents should have this explained to them or the slight scar of well executed treatment may be a disappointment. Of the *vascular nævi*, the superficial capillary type which are pink and not raised respond very well to freezing with carbon dioxide snow for 20 to 60 seconds. It is usual to apply a firm stick of compressed snow, but large capillary *nævi* are better treated by painting with a slush made by adding acetone in small quantities to the powdered snow until a pasty mass results and this adheres quite well to a camel-hair brush. The slush is more quickly effective than the stick and freezes the skin solid at once but successive paintings must be made to keep the skin frozen for 15 to 30 seconds.

Calamine lotion is a useful placebo and when the inflammatory reaction is over, treatment may be repeated.

Port-wine marks respond badly to freezing; indeed treatment of any kind is so unsatisfactory that most dermatologists prefer to leave them alone. *Cavernous nævi*, the raised blue cystic swellings, are usually too deep and contain too much blood to be affected by freezing and as a sequel of such treatment an obvious scar with the cavernous nævus persisting is often seen. Since these nævi are rarely if ever seen in adults, presumably spontaneous disappearance occurs and unless the nævus is very conspicuous or is rapidly growing it is better left alone. When treatment is called for, screened radium gives the best results but the swelling may be removed by injecting a few minims of dilute hydrochloric acid or tincture of iodine into several parts of it. Often the skin over a cavernous nævus is discoloured by a capillary one too, in which case it is reasonable to apply carbon dioxide snow for its superficial effect, hoping for but not expecting some resolution of the cavernous element. An old method of treatment is to vaccinate upon a vascular nævus and fig. 1 shows what success may be antici-

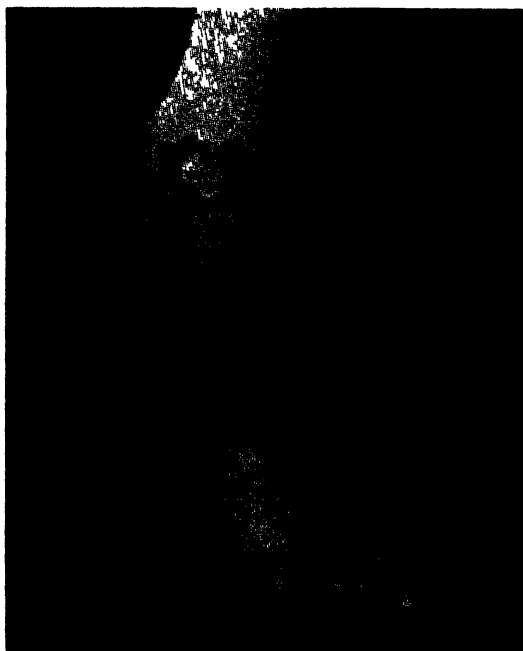


FIG. 1.—Result of vaccination upon a raised vascular nævus.

pated. Whether or not it is justified to give the virus greater facilities for entering the blood stream in order to obtain such a result is worth consideration.

Pigmented naevi are better excised during pre-school years unless too extensive as in fig. 2 when nothing can be done.

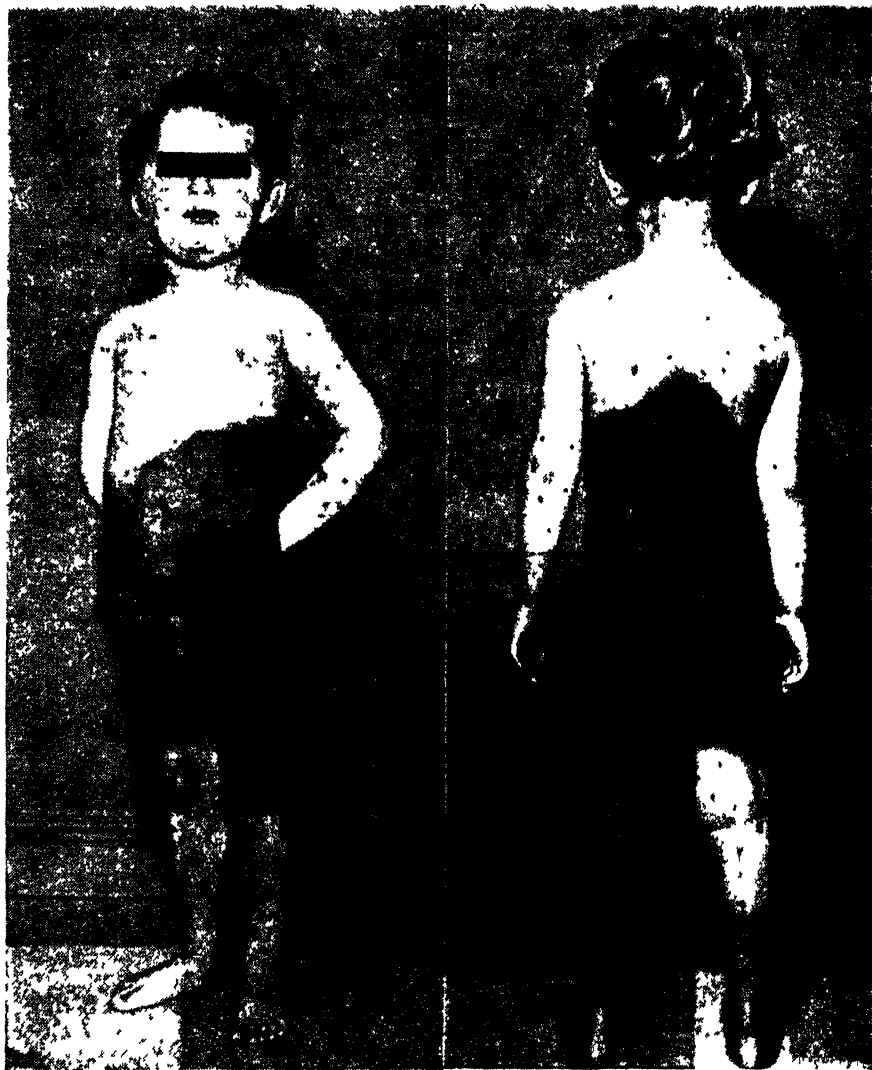


FIG. 2.—Extensive pigmented hairy mole with satellites.

Excision secures the best cosmetic result for warty naevi too, but the small or linear ones may be destroyed by diathermy or cautery. Fig. 3 shows a *linear type of warty naevus* associated with

club foot. Other developmental defects are not infrequently present with birth-marks and should be looked for.

STRUCTURAL ABNORMALITIES

Xerodermia (dry skin) and the more severe varieties with scaling (*ichthyosis*) are structural abnormalities and as such can be alleviated but not cured. In warm weather the extra activity of the glands in the skin brings some improvement and this may be imitated in winter by thyroid medication and warm clothing. Emollient glycerin lotions or oils are essential and daily anointings are usually necessary. Olive oil

and its cheaper substitutes are commonly used but a useful addition is liquid paraffin. The vegetable oils are readily absorbed by the skin which shortly appears dry again, whereas the mineral oil cannot be metabolized and has a much more lasting effect. These unfortunate children are often regarded as unclean and ill-kept, but nothing short of sand-paper would clean some ichthyotics.

Epidermolysis bullosa is a rarity but worthy of mention because it is readily recognized and has to be considered amongst other bullous eruptions of childhood. The skin in this condition is unusually susceptible to injury and slight trauma is followed by blister formation. Naturally the skin over the bony prominences of the hands, arms, feet and legs is most frequently injured and blisters are most common on those sites.

In one severe case under observation blebs were seen to arise between the fingers as they rubbed together in a newly born baby and up to the age of eleven when the girl was last seen she was scarcely ever without a blister, some two inches in diameter and often blood-stained; but she was improving as cases do in time. No satisfactory treatment is known.

CONGENITAL HAIR DEFECTS

Congenital abnormalities of the hair are included because of



FIG 3 —Linear warty naevus and club foot

their importance in the diagnosis of ringworm. First is a form of ectodermal defect in which a child's hair will only grow to a length of a centimetre or so, although phases of almost normal growth occur, also alopecia, patchy or complete. Then there is monilithrix, a curious beaded condition of the hair presumably arising through rhythmic variations in the activity of the hair follicles, the hair shaft being alternatively thick and thin and apt to break at the thin internodes. The other condition is one of abnormal fragility of the hair (trichorrhexis nodosa) in which the hair breaks with longitudinal disruption of the shaft giving the appearance of two coarse brushes pushed together, bristles apposed. The microscope readily distinguishes these three conditions from tinea to which they have some clinical resemblances.

ACQUIRED DISEASES

The acquired skin diseases may be relics carried over from infancy and eczema is a common legacy to the pre-school child. *Eczema* can usually be diagnosed on sight, the most characteristic features being grouped, small, pink, papulo-vesicles tending to weep or surmounted by golden plasma crusts, set in non-inflamed skin. Phases of acute irritation and the absence of recognizable external causal irritants confirm the diagnosis. It is most helpful to regard eczema as a manifestation of localized hyper-sensitivity of the skin in a hyper-sensitive child, and the term allergy as generally used means nothing more than this. In rare instances something specific in diet or environment provokes the eczematous attack but usually this has been suspected or identified during infancy. A true allergen will quickly cause an eczematous attack or an exacerbation of an existing one if the patient is sensitized to it and avoidance of the allergen should result in marked improvement. This obvious relationship is often forgotten and children are frequently seen who have been on a dietetic regime troublesome and costly to mothers for months without any appreciable benefit. The first advice to the mother is to put the child on normal diet and if acute phases occur to list all the foods given at the preceding meal; when a number of such lists are

obtained it may be found that one food is common to all. This food should then be totally withdrawn and progress observed; later on the suspected food allergen should be re-introduced, when, if it is a causal factor, a skin reaction will follow.

In the phases of acute irritation sedatives are essential, for most of the visible skin lesions are caused by rubbing and scratching and it is cruel to restrain the patient without attempting to relieve its misery. Alkalis generally diminish the sensitivity of the skin, and in particular instances acids and pepsin help, presumably by improving gastric digestion. In other cases definite improvement has followed treatment with calcium, vitamins A and D, small doses of thyroid or grey powder. Local treatment must be experimental since the blandest emollients seem to irritate some skins. For moist lesions the lotion of calamine is a useful base and to this may be added 1 to 2 per cent. solution of coal tar as an antipruritic, or the same proportion of ichthyol; 1 per cent. of strong solution of lead subacetate as an astringent; 1 in 1,000 mercury perchloride if secondary infection is present. When the watery applications aggravate, the creams of zinc or calamine may be substituted and modified as above or zinc paste may be used as the base with 2 per cent. of tar or ichthyol added. Washing with soap and water may have to be suspended temporarily and cleansing with olive oil or liquid paraffin substituted but the latter are poor substitutes and water is often better tolerated as isotonic solutions of common salt or sodium bicarbonate, or when bran compresses are used as sponges.

Seborrhœa often occurs with eczema, frequently precedes the attack, and may be the cause of it. The term is used rather loosely but is probably justified when the first skin trouble appears as a scurfy scalp which may then become erythematous, weeping and crusted, the condition spreading in continuity to the forehead, face and neck. Seborrhœic dermatitis is apt to affect the flexures and particularly to cause trouble about the ears. The eczematous areas are best treated with the ichthyol preparations mentioned above but the scalp usually needs ointments containing sulphur, salicylic acid or

resorcin.

The following ointment and oily liniment are helpful:—

℞ Precipitated sulphur	-	-	-	-	-	15 grains
Salicylic acid	-	-	-	-	-	10 grains
Coconut oil ointment to 1 ounce						
Salicylic acid	-	-	-	-	-	20 grains
Industrial methylated spirit	-	-	-	-	-	60 minims
Castor oil to 1 ounce						

Thirty minims of oil of cade or of solution of coal tar may be added to either of these.

Frequent shampoos with sulphur toilet soap are advisable. Spirit soap is very good when the scalp is not inflamed and this soap may be medicated with similar quantities of the oil of cade or tar as above mentioned.

Urticaria is common in young children and is usually of the papular variety. The discrete shotty papules which come out in crops and disappear as quickly as they arise can scarcely be mistaken but the vesicular and bullous types seem to cause much trouble in diagnosis. Fig. 4 shows how large a blister may



FIG. 4.—Bullous urticaria.

be in such cases but even here the smaller vesico-papules and shotty papules give ample indications of the true nature of the eruption. It should be remembered that exudation is an essential part of the urticarial reaction and if this is excessive or the epidermal structure permits easy penetration, fluid collects beneath the horny layer and becomes apparent as a vesicle or bleb. Although urticaria affects the trunk it is more common on the limbs in the pre-school child and the vesicles becoming pustular, as they often do, suggests scabies;

the dermatologist has sometimes to reassure junior casualty

officers that such cases are not smallpox. The absence of constitutional symptoms and the marked itching make the exclusion of variola simple as a rule. Large blebs on the limbs suggest epidermolysis bullosa but in that condition the history is a long one and small irritating papules do not occur. Pemphigus and dermatitis herpetiformis are so rare at these ages that it is unwise to diagnose them. The bullous type of impetigo may resemble urticaria but being of pus-coccal origin the base of the lesion is inflamed and satellite impetiginous sores are usually seen. Simple treatment often suffices and the majority of cases of urticaria clear up on rhubarb, soda, and grey powder. Some respond better to calcium, vitamins A and D, or to ichthyol 3 to 5 grains internally. A favourite application is phenol $1\frac{1}{2}$ per cent. in calamine lotion which not only allays irritation but retards infection of the lesions.

Scabies is often confused with urticaria and frequently the two conditions co-exist, for the scratching caused by the parasites brings up urticarial papules and wheals in susceptible subjects. In scabies and urticaria, lesions are often present on the palms and soles but even if the acarus does not form the characteristic burrows it is likely to produce linear lesions in the palmar creases and in those of the wrists, especially on the ulnar side. Suggestive of scabies is the widely spread eruption on the inner aspects of the arms, the axillary folds, the trunk especially about the navel, genitals and gluteal cleft, and on the thighs and feet. The diagnosis is usually confirmed with ease by moistening the wavy black line of a burrow and the small papulo-vesicles with potash solution and scraping away the upper layers of the skin until capillary oozing is seen; then mounting all of the scrapings in more potash to examine under a low power of a microscope. The presence of one egg is complete confirmation and many a disputed diagnosis has been cleared up in a few minutes by this simple procedure. If other members of the household are infected the probability of scabies is increased and in any doubt vigorous treatment should be instituted. An effective and well-tried regime is for the patient to be given hot baths on three successive nights, scrubbing well with soft soap and after drying, the inunction

of sulphur ointment to the whole body. Children are best kept in bed in old night-clothes until the fourth day when a further bath is followed by a complete change of clothes and bedding. To prevent re-infection, clothes and bedding must be disinfected. The official sulphur ointment may advantageously be diluted with an equal part of zinc ointment for delicate skins, or balsam of Peru 60 grains in one ounce of vaseline may be substituted. Some follicular dermatitis often remains after treatment and will respond to calamine lotion or ichthyol cream.

Impetigo of the common type is readily recognized but it has a number of clinical forms which cause difficulty in diagnosis. The bullous type has to be distinguished from bullous urticaria and in young children it is a frequent complication of scabies. When the blisters rupture the margins persist and as the central part heals, circinate lesions remain to be confused with tinea. In impetigo, evolution is rapid and the clinical course is measured in days, whereas similar developments in ringworm infection take weeks. Usually the margins of tinea circinata are dry, scaly and are made up of small pustules. The presence of fungus can be demonstrated in scrapings from the edges of such lesions.

Scaly impetigo (*impetigo pityroides*) is seen mixed up with other types and most resembles a seborrhœic dermatitis. This type is most common on the face and neck and may be persistent near the angles of the mouth where it appears to have its origin from a chronic fissure. Such fissures are a further result of coccogenic infection and may also be found at the sides of the nose, behind the ears and at the top of the gluteal cleft. Spreading from these fissures a moist pus-coccal dermatitis may arise to involve the folds of skin and produce intertrigo.

TREATMENT OF INFECTIONS

In treating infections of the skin it should be a general rule to keep the skin surface clean and dry. After all, bacteria are minute plants and need moisture for their growth and a dry, intact horny layer is an acrid desert to micro-organisms. A film of grease retains sweat and must make the skin more vulner-

able and the vast majority of cases of impetigo sent to hospital because of unsatisfactory progress have been treated with ointments. Many of these cases clear up within a week when cleansing with soap and water followed by calamine lotion is instituted. If an antiseptic seems to be indicated 1 in 1,000 perchloride of mercury may be added to the calamine or the same strength of acriflavine solution in water may be used. When the lesions remain moist a paint of 2 to 5 per cent. of silver nitrate may be applied several times a day or a dusting powder of zinc and starch with 10 per cent. of calomel.

If the skin becomes too dry and cracks, 3 per cent. of yellow oxide of mercury in plain zinc paste is useful and for the chronic fissures at the angles of the mouth and nose dilute mercury nitrate ointment may be tried. When a child spreads impetigo by scratching, the nails should be cut short and painted with an antiseptic daily. The skin lesions may be dried and made less infectious by painting them with the following paint:—

R Malachite green

Mercury perchloride, of each - - - 5 grains

Distilled water - - - - - 60 minims

Industrial methylated spirit to 1 ounce.

Impetigo of the scalp is a special problem and may become terribly chronic. Frequent cleansing is important and again it is better to begin with antiseptic lotions, although the cautious use of mercurial ointments is helpful to prevent hard crusts forming. The malachite green paint is very useful in impetigo capitis as a rule.

Ringworm of the scalp is a particularly urgent problem since any residual infection prevents the child going to school. Diagnosis depends upon finding dry, dirty-coloured scaly areas covered incompletely with short dull stubble and broken hairs. Alopecia areata, rather rare in young children except after severe infections, presents a clean, smooth bald area which may have short hairs near the edges, but these hairs are glossy and have pigmented broad upper ends and thin, pale attachments to the scalp which make such hairs resemble notes of exclamation. Every doubtful case should be regarded as

ringworm until microscopical examination has proved negative. An even more critical method of examination is by means of Wood's glass filter and an ultra-violet lamp. Most of the visible light is cut off with this filter and in the relative darkness the ringworm-infected hairs stand out with bright green fluorescence. A single infected hair may be spotted with ease and short experience with the apparatus can make a novice more certain in the diagnosis of microsporon infections of the scalp than an experienced dermatologist solely dependent upon the usual clinical features. Use of this lamp has shown that diffuse infection of the scalp may be present without obvious signs and since its introduction there have been many more disappointments after treatment. Quite a number of cases after effective epilation by X-rays or thallium and full treatment have been found to be still infected although the new hair grew well, had good lustre and did not break, nor was the scalp scurfy. This emphasizes the necessity of explaining to the parents that X-rays or thallium are not treatments for the ringworm infection but merely secure epilation so that antiparasitic remedies may be more effectively applied to the infected follicles. Without epilation, treatment usually takes years and all this time the child cannot attend school. The majority of cases after X-ray epilation and proper treatment with mercurial ointments clear up in two or three months. Thallium acetate is generally thought to be less successful than X-rays as regards the treatment response although epilation is quite as effective. The drug treatment is especially suitable for children of the pre-school age and with meticulous care as to dosage the dangers are slight but in London the concensus of opinion favours X-rays.

DIET OF THE PRE-SCHOOL CHILD

By CATHERINE CHISHOLM, C.B.E., M.D.

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THE object of diet in childhood is to produce a well-grown youngster with bright colouring, clear skin, good teeth, firm muscles, sound bones, and well-adjusted nervous system. Mistakes made at this stage either in wrong proportions in the diet, in the omission of essential factors of diet, or in dealing with the emotional reactions of the child may be later in-eradicable. As Orr states¹:—

It has been established in nutritional studies that the constitution of the adult is affected by the state of nutrition in childhood.

From the age of one to five or six the child grows rapidly, increasing in height from about 2 ft. 10½ in. to 3 ft. 6½ in. or 3 ft. 7 in., and his weight on an average increases from 26·5 to 40 lb.; that is, he increases his height by more than one-fifth, and his weight by about one-third. His food meanwhile changes from the fluid, or almost fluid, type of infancy to the more solid and mixed diet of adult life. The child must accustom himself to this change. Psychically he is passing from the stage when he is an inarticulate infant completely under the control of his nurses to one in which he is acutely conscious of his ego and able to assert himself, but cannot yet realize the consequence of ill-advised action. The problem of feeding at this age is both physiological and psychological.

GENERAL PRINCIPLES

A diet must be considered in the terms of: (a) the caloric requirements for producing heat, energy, and growth; (b) the food factors necessary for correct bodily development; (c) the cost of such a diet; (d) the power of the child to assimilate the diet; (e) the mental reaction of the child to the food provided.

It is obvious that the caloric value of the food must be sufficient to provide heat and energy, to promote growth and to repair

waste. In drawing up such a diet the calculation must not only consider that the child is active and growing rapidly, but that a small body needs more in proportion to its size than a large one, in order to provide for the extra loss of heat due to the comparatively greater surface area. So the allowance of calories to pound of body-weight must be generous. In Cathcart and Murray's tables² the calories allotted to a child at two to three years of age is 1,600 or 0·4 man value, and a child three to six 1,700 calories or 0·5 man value. These values are greater than those allowed by Holt³ who suggested 1,450 calories for a child of five, thus allowing 36 calories per lb. of child.

Obviously, values will vary according to the environment and the activity of the child and the climatic conditions. For example, activity will demand sugar, summer heat will mean more fluid, and winter an extra supply of fat. But calculations of calories are, after all, only of practical value to check the knowledge that sufficient is being offered.

Idiosyncrasy of the child will allow one to thrive on comparatively little and another to need a great deal more. It is well, therefore, to allow a child to eat according to its appetite provided that the food offered is balanced and plain, the interval between the meals sufficiently long, and the child vigorous and healthy in appearance.

CONSTITUENTS OF THE DIET

When the constituents of the diet are considered it is necessary to note that for promoting growth essential amino-acids, which are mainly supplied in animal protein, must be supplied. At least half the protein therefore should be from such animal sources as eggs, meat, fish, and milk and its derivatives, cheese and curds. A large amount of protein is required and one of the common mistakes made by the mother in the diet of the pre-school child is to give too little protein. The amount of protein per lb. of body-weight necessary in childhood is two to four times more than that needed in manhood. Of all ways of giving protein none surpasses milk.

Recent studies in Scotland and England^{4,5} have shown the

importance of this foodstuff both as a promoter of growth and a protective agency against infection. It is agreed that at least a pint of milk a day should be given to the growing child, and many children, both convalescent from illness and in rude health, take that amount and more in fluid milk *in addition* to that provided in other forms of food. Buttermilk and skim milk are also valuable sources of protein containing the growth factor. Full milk also provides fat, which is necessary both for warmth and as a vehicle of the two vitamins A and D. These vitamins are found also in other forms of animal fat—butter, egg yolk, liver, kidneys. It is important to present foodstuffs such as vitamins in as natural a form as possible, and to avoid having to supplement the prescribed diet out of tins of standardized preparations whether of vitamins or minerals or special forms of sugar. It is better to give cod-liver oil than isolated vitamin D. As E. Mellanby says⁶ :—

It is better to give cod-liver oil than vitamin D itself. Most rachitic children suffer from other forms of malnutrition than that due to lack of vitamin D only, and the vitamin A and iodine of cod-liver oil are often very beneficial. To say that every child with rickets only requires, for instance, 3,000 international units of vitamin D to cure the disease is misleading. The best curative dose depends on the rest of the diet. Some children's diets are so poor in calcium that 3,000 units of vitamin D has only very slow curative effects and even larger doses may be but little better. Under these conditions also curative effects at the epiphyses may take place at the expense of the calcium in the bone shaft.

Modern research shows how many accessory factors of diet are found in association. It is essential to learn to isolate the vitamins and to study their action. It can then be seen that the diet contains a sufficient amount of the known vitamins. But by supplying them as standardized products rather than in their natural sources other, as yet unknown, factors naturally associated with them may be lost, and a meal is made complicated and medicinal. Only when digestion does not tolerate the natural medium should the standardized preparations be used in the pre-school child's diet.

Carbohydrate is often found to be disproportionately high in children's diets, especially in the working-class, because it is satisfying and cheap. The taste for sugar is natural and

sugar is beneficial to children. They should be supplied with it in the form of both starch and sugar, but not at the expense of protein and fat. It is a mistake to teach that there is great virtue in glucose as a magic powder given in addition to a diet. Sufficient sugar should be included in the diet itself. If extra glucose is needed it is generally better to give it at the end of the meal as barley sugar, for it will then seem an added pleasure without any association of medicaments. The psychological effect of extra fussing cannot be too strongly deprecated.

Iron, calcium, phosphorus, iodine, potassium and other minerals will be found in a good dairy diet supplemented by fruit and vegetables, and in this way too the remaining important vitamins, i.e. the various forms of B and C as well as A can be included. The fruits and vegetables also will provide the roughage without which no diet is satisfactory.

The taste for these articles of diet often has to be cultivated and this should be done while the child is young. When possible the fruit and not just fruit juice should be given to the pre-school child. Tomato and banana are easily taken. The banana should be the true banana, not the plantain, and should be very ripe. Oranges can be sucked. If divided into segments the small child needs the outside skin to be separated. Apples are readily eaten raw.

An ample allowance of fluid should be provided. Milk should be regarded as a food. The habit of drinking cold water must be encouraged. Orange water, lemonade, barley water can be given, but the child should be encouraged to love pure water. When he is playing he should always be encouraged to drink, but taught to drink properly in mouthfuls and not in long draughts. When he gets overheated he will naturally demand fluid. Apart from the æsthetic necessity of forming good habits the cold fluid which an excited child will gulp down may cause gastric discomfort from tension, and shock from the sudden cold applied to the gastric mucous membrane.

It is evident from the above that the pre-school child's diet must contain foods which are comparatively expensive. First-

class protein, animal fat and fresh vegetables are a great tax on the housekeeping bills. In the British Medical Association's excellent Report of Committee on Nutrition,⁷ tables are given of specimen diets at minimum cost made after careful investigation. It will be seen that the minimum cost for a sufficient diet for a child of two or three years is 36·75 pence per week, and for a child of three to five years, 40·75 pence. But this is the minimum cost and does not allow of much choice and none but the cheapest vegetables and fruit. The very fact that the child is often very conservative in his taste makes it important to accustom him early to variety of flavour. The appetite of some children on the other hand is affected adversely by monotony. So in both cases it is advisable to arrange for variety in the food. It is obvious that many of the foods suggested in the dietaries below would be impossible if the cost were limited to the above sum.

ARRANGING THE DIET

In the arrangement of the daily diet other details must be considered. From the first good habits in eating and drinking should be inculcated and food should be carefully masticated. The mother should be urged to start breakfast sufficiently early if the child is attending the nursery school as no meal should be taken in an atmosphere of hurry. The meals must be sufficiently spaced to ensure appetite. In order to provide for complete digestion the child's day should be so arranged that he has sufficient rest. A fatigued child does not eat well or digest properly what he has eaten. A rest after the mid-day meal is necessary up to the fifth, if not the sixth, birthday. Light food last thing before bedtime may prevent restless nights. For the development of the teeth and jaw sufficient hard food should be provided, Nursery food is too often sloppy.

Two conditions may, however, cause difficulty in arranging the nursery diet: (1) Anorexia, (2) Acidosis. Apart from serious illness, only the emotional and/or the spoiled child persistently refuses food. The appetite of most children fails for a day or two at some time. The mother should display no anxiety. Having ascertained that the bowels are acting, and

Some children tolerate fat badly and easily get attacks of acidosis. These children are also generally of a nervous type. With limitation of the fat, the substitution of skim milk or butter-milk for full milk, and with plenty of rest, the attacks become less frequent and severe. Here the standardized

Diet for Child 2-5 years

TIME	FOOD	oz.	Calor. 100 g.	Total calories	Pro- tein	Fat	Carbo- hyd.	Pro- tein in oz.	Fat in oz.	Car- bohyd. in oz.
7:30 or on waking	Apple - - -	3	27	27	.3	.3	9.7	.009	.009	.291
	BREAKFAST.									
8:30 a.m.	Milk - - -	8	160		3.2	3.8	5.0	.256	.304	.4
	Cocoa - - -	$\frac{1}{2}$	17		17.8	27.2	38.6	.022	.038	.048
	Sugar - - -	$\frac{1}{2}$	14		—	—	100.0	—	—	.125
	Toast - - -	2	148		8.75	.86	56.65	.175	.0172	1.133
	Butter - - -	$\frac{1}{2}$	36		1.0	80.8	—	.0016	.134	—
	Bacon - - -	$\frac{1}{2}$	150		13.8	31.7	—	.207	.475	—
	Tomato - - -	1	6		.7	.4	3.8	.007	.004	.038
	Marmalade - -	$\frac{1}{2}$	30		.2	—	68.6	.0005	—	.343
	Piece of raw apple -	$\frac{1}{2}$	6	567	.3	.3	9.7	.0015	.0015	.0485
	DINNER.									
12:30 p.m.	Hake or white fish	3	42		10.8	.2	—	.324	.006	—
	Sauce - - -	$\frac{1}{2}$	20		—	—	—	.0214	.0399	.0603
	Potato boiled in skin - - -	3	36		1.3	.1	14.2	.039	.003	.426
	Greens - - -	2	14		1.1	.2	4.7	.022	.004	.094
	Apples, stewed -	$\frac{1}{2}$	52		—	—	—	.003	.003	.441
	Pastry - - -	1	128		—	—	—	.064	.250	.449
	Egg custard - -	2	60		—	—	—	.1048	.105	.2
	Boiled sweets -	$\frac{1}{2}$	50		—	—	—	—	—	.5
	Piece of celery -	$\frac{1}{2}$	2	404	.7	.1	2.6	.0035	.0005	.013
	TEA.									
4:30 to 5:0	Milk - - -	8	160		3.2	3.8	5.0	.256	.304	.4
	Ovaltine - - -	$\frac{1}{2}$	17		17.8	27.2	38.6	.022	.038	.048
	Sugar - - -	$\frac{1}{2}$	14		—	—	100.0	—	—	.125
	Toast brown bread	$\frac{1}{2}$	111		8.75	.86	56.65	.1312	.0129	.849
	Butter or dripping	$\frac{1}{2}$	36		1.0	80.8	—	.0016	.134	—
	Green salad - -	3	36		—	—	—	.045	.027	.104
	Cake - - -	1	116		—	—	—	.055	.126	.425
	Piece of raw apple	1	6	496	.3	.3	9.7	.003	.003	.097
	BEDTIME DRINK.									
6:30 p.m.	Milk - - -	4	80	80	3.2	3.8	5.0	.125	.152	.2
Total calories per day 1524										
								1.9001	2.1910	6.859

preparations of vitamins and glucose are helpful.

The previous two diets are examples of the way in which a balanced model meal can be provided for the child from one to two years of age and from two to five. These diets are taken from the model diets of the Maternity and Child Welfare Department of the Manchester Public Health Department, and are given to show the way hard food can be included. The meal ends with fruit. There is in each diet a pint of milk and the total calories and the proportions of constituents are carefully calculated.

Children will often eat far more than is allowed in the above diets. If good plain food is provided they may be trusted on the whole to eat what suits them. Only abnormal children need very careful dieting. Cereals forbidden by May Mellanby⁸ to the very young child are included in these diets for she agrees that good teeth can be secured even when cereal is included, if vitamin D (together with calcium and phosphorus) is sufficiently provided, and it is often impracticable to omit cereal from a household diet. Tea and coffee should be forbidden.

Further suggestions for varied meals are given below:

- 7.0 clock. Apple or orange.
- 8.0.—Breakfast. Cereal with milk
 or porridge with milk.
 and toast, fried or dry, with butter or butter and honey,
 or pease pudding,
 or egg,
 or bacon (thin fried for older children),
 or fish pie.
- Dinner. Choice of Scotch broth,
 potato soup,
 pea soup,
 vegetable soup,
 tomato soup with potato,
 or minced meat,
 cottage pie (made with fresh meat),
 fish—boiled or steamed or cooked with milk,
 steamed soft roes on crisp toast,
 liver, tripe, or brains,
 sardines,
 egg dishes,
 lamb chops,
 chicken,
 together with

potatoes—steamed, baked, or mashed,
and cauliflower, sprouts, carrots, spinach, or other
vegetables.

and Milk puddings—with or without stewed fruit,
choice of prunes, etc.,

suet puddings,
apple dumplings,
jam roll,
castle pudding,
custard and fruit,
junket and fruit,
stewed rhubarb,
chocolate mould.

Raw fruit to finish—apple, orange, banana.

Tea. Oatcake or crisp bread, toast, rusks, with cream
cheese and butter,
or jam sandwiches,
or egg and cress sandwiches,
or lettuce sandwiches,
and plain cakes—madeira, sponge, shortbread biscuits.
In addition the older child can be given an egg or
sardines.

Bedtime. Glass of milk,
or occasional bowl of soup.
Piece of apple or orange.

In conclusion, diet, exercise, sleep, fresh air, and sunlight
are interdependent factors in producing correct growth, and
without the others no diet is completely successful.

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PLASTER OF PARIS TECHNIQUE IN THE TREATMENT OF SURGICAL TUBERCULOSIS AND OTHER CONDITIONS

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IF only one material were available for the purpose of splintage, there is little doubt that plaster of Paris would be the material selected, and that the necessary skill required in the application of these splints would result in immense improvement in their manufacture. Plaster of Paris is made from gypsum, the chemical composition of which is $\text{CaSO}_4 + \text{H}_2\text{O}$. This is finely ground and heated to a temperature of about 180°C ., but the details of its manufacture vary with different makers, and there are wide variations in its quality. The type of plaster I use for splints is described as extra-Italian superfine of the first quality procurable, but even from the same makers different batches of plaster will be found to vary somewhat in quality and in the quickness of set. The speed of set may be varied by the addition of accelerators or retarders. Frequently used accelerators are common salt in the proportion of 2 to 3 per cent., alum or potassium sulphate, but all these tend to make the resulting plaster more brittle and although useful for taking casts or for other special purposes such as dental work, are best avoided in making splints. Plaster sets more quickly in hot than cold water, but the resulting set is not so firm. Retarders such as glue, hair, starch and glycerin, are not indicated in orthopædic work. Pure, finely ground and dry plaster is the best for ordinary surgical purposes without the use of accelerators or retarders.

THE MAKING OF PLASTER BANDAGES

Simple book muslin, not impregnated with starch or dextrin and with some 32 strands to the inch is a suitable base. The width of the bandage being decided upon, it is desirable to fray

the edges, so that the annoyance of strips of cotton caught in the fingers and interfering with the application of the bandage is avoided. The frayed bandage is rolled and one end placed in a bowl of dry plaster, lying in contact with the plaster. Plaster is gently and evenly rubbed on to the upper side of the bandage insuring its thorough incorporation. The bandage is loosely rolled during this process, so that when immersed the water will readily penetrate to all parts of the bandage and not leave the centre dry or insufficiently saturated. With very little practice these bandages may be rapidly made and will be found extremely satisfactory, and better and much cheaper than prepared bandages sold by the makers. Immediately prior to application, a strip equal to about half the circumference of the bandage is unrolled, the bandage placed sideways into water so that the air readily escapes and the water permeates it thoroughly. The bandage is removed by seizing each end with one hand and squeezing the water out but leaving the plaster *in situ*.

PREPARATION OF THE PATIENT

The patient's skin should be clean, and, therefore, for out-patients, it should be carefully washed and powdered before the plaster is applied. If this precaution be not taken sores at pressure points may more readily arise, at first without the patient's knowledge, and may cause trouble and anxiety and be not devoid of danger. The onset of a plaster sore may often be detected before the skin has broken as the superficial organisms multiplying and inflaming the skin emit an unpleasant odour like that of an unwashed person. If a window be at once cut at the site of this smell a sore may often be avoided. When a plaster jacket is to be applied in the vertical position to a patient who has been treated recumbently for some time, he should be gradually tilted for increasing periods daily for at least a fortnight, when he should be able to remain in the vertical position without undue discomfort during the application. Neglect of this precaution will often result in dizziness, fainting and sometimes vomiting and causes much unnecessary distress. It is desirable, before

applying these jackets, to ensure that the bowels have been opened and that food likely to cause flatulence has been avoided for two days previously.

The trunk or limb to be plastered should be enveloped in a close fitting cotton vest turned inside out so that the seam will not be in contact with the skin. This material is much better than the popular flannel bandage as it ensures closer and more even application of the plaster and facilitates moulding. Should there be fear of sores arising over pressure points, these may be padded with brown wool, lint or felt, but excess of such padding is unnecessary and to be deprecated.

If a plaster cast is to be taken, it is sufficient to vaseline the skin only. A thin strip of lead, 1 in. wide, should be placed along the line where the cast will be cut off and the plaster applied direct.

CERTAIN GENERAL PRINCIPLES CONCERNING PLASTER SPLINTS

A plaster splint should be as light as possible consistent with adequate strength. It is therefore unnecessary to apply plaster of similar thickness through the apparatus but, with a realization of the site of the chief strains, the plaster should be reinforced at those situations and the minimum of plaster applied elsewhere. A plaster splint may be reinforced by incorporation of other materials (wood, metal) but this is inadvisable as the rate of contraction and expansion differs from that of plaster and such materials are liable to work loose. It is preferable, whenever possible, to reinforce at appropriate positions with plaster bandage only and the difficulty of unequal expansion and contraction is obviated.

The first, simplest and most generally useful manoeuvre is to pleat the plaster bandage during application. A plaster bandage should never be reversed, for it is apt to cause constriction and is a crude method of altering the direction of application. When possible, it is desirable to pass the bandage round the limb or trunk obliquely and not at right angles to the long axis of the limb. If at least once in every circuit the bandage is

pleated and these pleats are contiguous to each other there will be three layers of bandage of any desired width at the situation of the pleat to one elsewhere, and this pleating may be repeated indefinitely. Moreover, the bandage will proceed on naturally and with no unnecessary creases. There are certain situations where such pleating is especially useful, e.g. in the groin, where the strain on the apparatus may be considerable, and in situations where moulding is needed, as for example, above the femoral condyles. The pleat has the added advantage, especially in a trunk plaster, of allowing a certain amount of give before setting, which permits the abdomen or chest to expand to its full capacity, and thus undue constriction is avoided.

With each turn of the plaster bandage round the object to which it is applied, the plaster should be gently rubbed in so as to incorporate it with the muslin and subjacent material. A soft rather slimy material is felt which will crystallize as it sets. These interlocking crystals will form a substance of almost stony hardness. To get the best effect, the hand should follow the direction of the plaster bandage and not rub at right angles to it or in any other direction. Plaster splints may be reinforced in any situation by the application of a slab. A slab is made of any required length by merely folding to and fro a wet plaster bandage on to a smooth hard surface such as the metal or glass top of an instrument trolley. Between each fold the bandage is rubbed with the wet gloved hand in the direction the bandage has travelled. The slab is then applied to the splint to be reinforced in any desired manner. A useful modification is to pull the slab through the closed hand and form a cord of plaster and muslin which may now be applied to the splint as a strut (Fig. 1). If a window is to be cut in a plaster splint, as for example to allow drainage from a sinus or to keep an abscess under observation, and the splint be thereby weakened, the splint may be strengthened by encircling the window with a strut, or by looping over the window with a bridge (Fig. 2). The ends of the bridge pressed down on the plaster may be kept adherent by bandaging them over with another plaster bandage, which may be usefully bound round the bridge. The

bridge is then held in the desired position until it sets. The strength of the plaster is demonstrated by the accompanying illustration (Fig. 3) which depicts a bridge made of plaster



FIG. 1.—A strut applied to a short plaster spica. Plaster bandage, of which the strut was made, was dipped into a solution of eosin to make it dark colour in the illustration for contrast.



FIG. 2.—A bridge being made on the plaster spica. Subjacent dark plaster consists of 2 slabs and a strut which have been coloured by eosin.

bandage and which is so strong that the patient may be suspended from it (Fig. 3).

After the desired plaster splint is applied any necessary windows may be at once cut out if required, but it is preferable to delay cutting out the windows until the splint is thoroughly dry, say in two days from its application. The

edges of the splint are then trimmed, the subjacent vesting turned back over the edges for about an inch, and fastened to the splint by plaster cream. Plaster cream of suitable consistency is made by adding three parts of water to five of dry plaster. The cream should be rubbed in a thin layer over the plaster splint and polished by the wet hand. The result is a smooth shiny white surface, which is easy to keep clean, adds immensely to the appearance of the finished plaster splint and lengthens the life of the apparatus. When

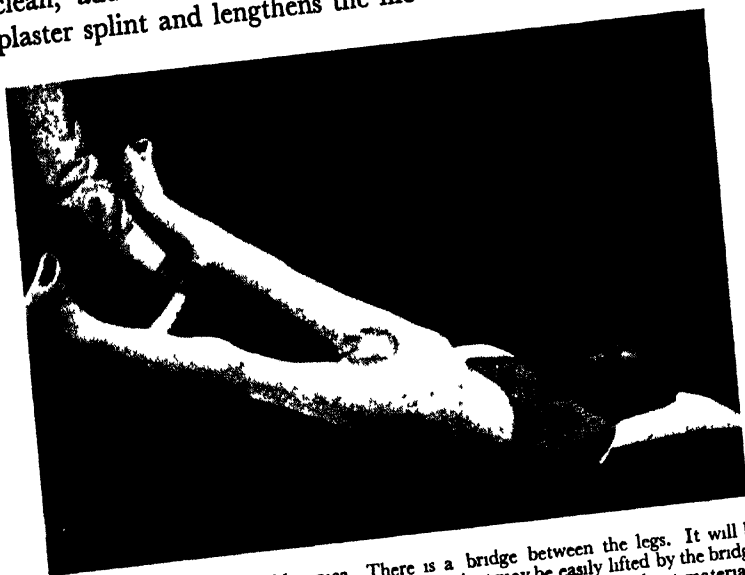


FIG. 3.—Patient in a double spica. There is a bridge between the legs. It will be noted that the plaster is very strong so that the patient may be easily lifted by the bridge. Note strut along the femur which immensely strengthens the plaster without materially adding to the weight.

soiled it may be scraped and washed and a fresh layer of plaster cream applied.

MOULDING

A manœuvre, the importance of which cannot be too strongly emphasized, is suitable moulding of a plaster splint. Much of the value of plaster of Paris is lost unless this is properly undertaken. For example, in the application of a plaster jacket, the whole value of the splint depends upon the support taken from the pelvis. Just before the plaster sets, therefore, the jacket should be moulded on the soft tissues immediately above the pelvic brim and the better the moulding the more efficient the jacket. Skill and experience are

requisite to ascertain the extent to which the splint should be moulded. No moulding should be made on bony prominences, but above and around these on the soft tissues. Moulding direct on bony prominences will lead to discomfort and sores.

VARIOUS PLASTER SPLINTS

The plaster jacket.—A plaster jacket is frequently required for treatment in the later stages of tuberculous disease of the spine, certain forms of scoliosis, and some fractures of the



Fig. 4.—Patient suspended on gallows preparatory to application of plaster jacket. Note heels just raised from ground.

spine. It may be applied in the vertical, ventrally recumbent or dorsally recumbent positions. In the former some form of gallows is needed and that shown in the accompanying illustration (Fig. 4) is most favoured by the author. A folding tripod gallows is useful for portability when the jacket is applied in the patient's own home. The trunk is enveloped in a close fitting vest turned inside out; under the vest and over the gastric region is inserted a pad of cotton-wool to

relieve any possible discomfort due to distension until a ventral window is cut out. For two days before application the patient should be given food unlikely to cause flatulent distension and the bowels should be kept well open. As a rule bony prominences need not be padded but in inexperienced hands a roll of cotton-wool may be applied around the iliac crests. The vest should be pinned under the perineum.

In cases of cervico-dorsal or cervical caries the vest should have a long neck which will extend over the head and is stitched there. A cut is made in the vest over the nose allowing the patient to see and breathe easily.

Suspension of the patient.—The patient is suspended from the occiput and chin by means of a suitable bridle (Fig. 5). The best



FIG 5 —Application of plaster jacket. Note position of patient, heels raised from the ground, back pressed forward and shoulders depressed.

is one made as follows for each individual case: Best calico 2 in. bandage, about 4 ft. long, is taken and an ordinary knot tied one-third of its length in such a way that a loop is left from the knot. The patient being held under the gallows

by an assistant, this knot is placed just over the right ear. One piece of the bandage is passed under the chin, the other under the occiput and another knot tied tightly in a similar position above the left ear. The longer end of the bandage is then passed through the loop left over the right ear and the two ends of the bandage tied by an ordinary reef knot. The patient is then suspended from the cross-piece of the gallows, extended just sufficiently for the heels to leave the ground. The back is pressed a little forwards and the patient's hands grasp the cross-piece at the sides of the gallows, thus depressing and pulling back the shoulders (Fig. 5). Note that the further forward the knots are over the ears the more the head will be hyperextended, the further back the more it will be flexed. This is important as lordosis may be corrected and compensatory curves reduced. The plaster is then applied from below upwards, a pleat made in each circuit of the trunk. When the axilla is reached, the shoulders are taken in by passing the bandage backwards and forwards from chest to back. These shoulder bandages are held in place by a bandage encircling the trunk twice, starting from the axilla and then continued round the neck. Now the pelvis and then the clavicles should be well moulded. If the head is to be incorporated for a Minerva or Fillet plaster, the plaster bandages are continued round the neck, pleating at least twice in each circuit. The bandage must pass from the neck around the head under the chin (for a Minerva) and under the occiput, the head being completely encased, except the face which is left free, and the plaster is carefully moulded under both mastoid processes and occiput and under the chin for the Minerva.

The jacket completed, the large ventral window is marked as is the edge of the plaster to be trimmed off, and the patient lifted down, the necessary parts being cut away as needed but preferably not until the next day if the patient is reasonably comfortable.

In actual practice I now rarely make a Minerva preferring a Fillet as more comfortable and equally effective. A Fillet on a skeleton is here illustrated (Fig. 6) showing the moulding and

the large ventral window which is essential for respiration and digestion and which ensures perfect fit without loss of strength.

The plaster bed.—A most useful apparatus, employed especially in active spinal caries, for operations on the vertebral column and for many cases of scoliosis is the plaster bed. Its manufacture is simple but varies in the hands of different surgeons. A method which may be generally employed is as follows. An ordinary bathing cap is placed on the head of the patient who then should be laid ventrally recumbent on a sheet



FIG. 6.—The "Fillet" applied to a skeleton to show the bony points around which the moulding should take place

covered table beneath which sheet is a thin mattress or folded blanket, with his chin supported by a small pillow. If there is too much lordosis a small pillow or similar object may be placed under the sheet in the region of the lordosed spine to straighten out the curve. The trunk is then placed in the selected position, e.g. if scoliotic the curvature corrected as much as possible and then the part to be plastered anointed with warm vaseline. Care should be taken that the vaseline is not too hot. If

the bed is required for the trunk only that part need only be anointed, if the head or legs or both need support they also receive similar treatment, the legs being placed in a suitably abducted position, with generally the knees slightly flexed. This is simply done by placing a sandbag under the legs in front of the ankles. Six-inch plaster bandages are suitable and are passed to and fro over the patient to the requisite thickness. It will often be found convenient to use plaster slabs to give added strength rapidly. Quite a thin plaster bed is all that is necessary as the bed may be reinforced, and indeed preferably should so be dealt with after removal from the patient. The bed is moulded in appropriate positions and as soon as it is set may be removed easily from the patient, completed by additional slabs or struts and appropriately lined with vesting or other material and padded with lint or sorbo, as and where required. The edges are trimmed, particular care being taken to cut well away below the axillæ to prevent pressure on the arms which might cause nerve pain or even pressure paralysis, and at the buttocks for sanitary reasons. If desired the plaster bed may be reinforced by slabs or struts, windows may be cut out if needed, and the bed may be mounted on wooden blocks as may seem desirable.

If a bivalve plaster bed is required, i.e. one half supporting the patient when ventrally recumbent, the other half when dorsally recumbent, essentially the same application of plaster is made with the patient lying on his back (Fig. 7). Such an

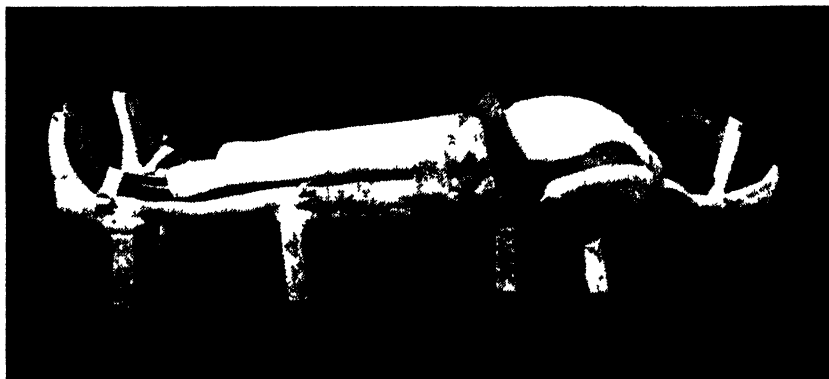


FIG. 7.—A bivalve plaster bed.

apparatus is specially indicated when operative treatment to the spine is to be undertaken. In these cases, however, instead of plastering the forehead, it is neater, more convenient and more comfortable for the patient to incorporate with the bed a shaped duralumin support, padded with sorbo and covered with chamois as illustrated (Fig. 8). When the patient is in the

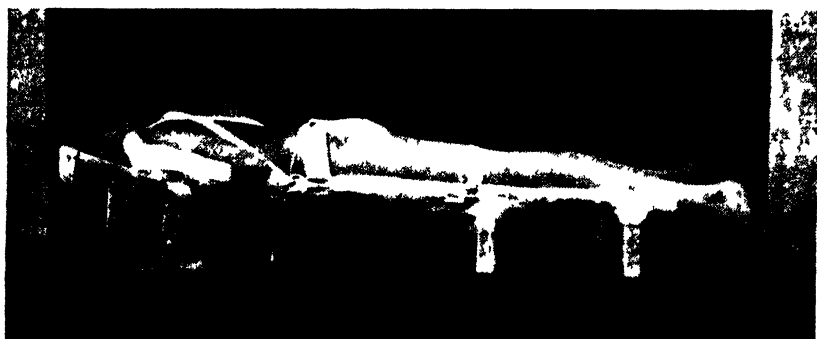


FIG. 8.—A patient in the ventrally recumbent position on the plaster bed. Note the duralumin head support which is convenient for anæsthetic purposes. The patient has scoliosis and is about to have his spine grafted.

ventrally recumbent position on such an apparatus an anæsthetic may be readily administered. Incorporated in these bi-valve beds are webbing straps with buckles and with both the ventral and dorsal beds applied the patient may be readily turned into either position without disturbing the spine.

Hip plasters.—A short or long plaster spica may be readily applied to a patient mounted on a suitable hip stand. Cotton pants turned inside out are put on the patient, taped over the shoulders to keep in position and if the feet are to be taken in the pants must extend below the toes. If bony projections are to be padded, tailors' wadding may be banded round the ankles, knees and femoral condyles and round the pelvis, over the pants. The foot should be maintained at right angles to the tibia, and I find it useful to roll a little lint around a narrow piece of wool and insert it under the pants from the toes to just above the ankle. This is removed after the plaster is applied, relieves the dorsum of the foot from all pressure and enables the foot to be further dorsiflexed if desired but not plantar flexed. The

knee may be maintained in a position of slight flexion and the hip placed in the position desired. Plaster bandages are applied as usual and moulding should be performed around the os calcis and malleoli, along the shin, around the femoral condyles and great trochanter and over the iliac bones and pubis. The plaster should extend to the lower costal margin but should be cut away from the level of the anterior axillary lines to the umbilicus to allow for abdominal distension. The plaster may be reinforced by struts, slabs or bridges as indicated. A common fault in many hip plasters is absence of covering of the buttock on the affected side. If a gap exists here the value of the splint is seriously affected as flexion may occur. It may be remedied by the application of a suitable slab extending from the loin on the opposite side, under the buttock and around the thigh. The plaster should be cut away in the groin on the sound side to allow full movement of the unaffected thigh.

Completion of plasters.—When any plaster is completed and dry, the edges should be trimmed and if possible bevelled, the subjacent vesting cut away for about an inch from the edge of the plaster, turned over the edge and fixed to the plaster by plaster cream. Plaster cream is then applied to the plaster by the finger tips, being gently rubbed in by the fingers which should be frequently moistened with cold water. As the water dries off the plaster will be found to have an egg-shell polish which is smooth, cleanly, improves the appearance and adds to the durability of the apparatus. It will be found that by applying these principles to a plaster in any part of the body an elegant and useful splint will have been made according to the skill of the operator.

CHRONIC AND IRREGULAR GOUT

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THE statement is frequently made that true gout is no longer in our midst. Such a statement is, however like most generalizations, only partially true. The conception of gout as the prerogative of "three bottle" octogenarian statesmen and admirals, must certainly be modified in this century, as must also the belief that it occurs invariably and exclusively in big toe joints. When acute gout does occur in its classical form, it is unlikely that it will not be diagnosed correctly. When however, its course runs contrary to tradition, it is insufficiently often diagnosed as such, although such cases are not rare.

The history of gout is an ancient one and centres round the names of Hippocrates, Sydenham, and Garrod; its golden age was the 18th century. With the close of that era it seems that the disease either became less common or changed its type. It seems probable that since the subsequent generations were less gross feeders, that the diathesis where present had less to "feed upon" and so would sometimes fail to mature. During the present century in spite of improved aids to diagnosis, physicians are less on the alert for the signs and symptoms of the disease, although it was estimated by Glover¹ as lately as 1924 that three per thousand insured workers become disabled by it annually.

Definition.—The gouty state, or "diathesis" is a complex metabolic disorder which affects particularly the disposal of the nucleo-protein radicle. This disorder is generally inherited. The possession of such a tendency may become manifest clinically in the form of acute or subacute attacks of peri-articular œdema, which may be provoked by a number of circumstances which include alcoholic or gastronomic excess. A specific feature of gout is the deposition of sodium biurate

both in the neighbourhood of the inflamed joints and later in certain poorly vascularized areas such as the cartilages of the ear and certain bursæ; these tophi are characteristic.

The disease is principally one of adult males, the average age of onset being 35. Women are not, however, immune but account for one case in about every twenty-five; it is rare, however, for female gout to declare itself prior to the menopause. Children with a bad heredity occasionally suffer, and Trousseau reported gout in a child of six. Gout, unlike most other rheumatic diseases, appears to be singularly unaffected by weather conditions; although it shows a very definite seasonal preference—a first attack generally occurring in the spring, whilst annual recurrences when they occur, generally do so at the same time of year. When two attacks occur in the same year the second attack will generally be in the autumn. In this connection Hamilton's researches on paralytic chorea in sheep² (loup-ill) may be recalled and are of interest. That disease occurs only in the spring, and he was able to show that sheep's blood taken at that season proved an excellent medium for the organism, while at all other times of year, it proved intensely bacteriolytic. Llewellyn on the basis of these observations suggested that gout might also have a directly infective origin, although he found that acute infections, such as gonorrhœa, run their usual course uninfluenced by gout at all seasons of the year.

Heredity.—Gout is the most hereditary of all forms of arthritis. It is, however, the predisposition which is transmitted and not the disease, since this may be dormant unless evoked, and may skip one or more generations. As has already been mentioned, the females of a family more commonly escape. Authorities disagree as to whether gout invariably occurs on an hereditary basis or whether it may be acquired *de novo*—Luff (1895)³ found in his series that an heredity factor could be elicited in 53 per cent. in the male line; in 21 per cent. in the female line; whilst 27 per cent. had missed one generation. In my own smaller number of cases, 70 per cent. have given an hereditary explanation for the disease. Certain authors have moreover thought that when

the victim of a gouty diathesis has lived a "godly, righteous and sober life" that the manifestations may develop otherwise than as true gout, and if this conception be accepted, these figures are probably too low. According to Llewellyn⁴, and more recently Gudzent, the inherited factor probably consists in a tendency to selective protein sensitization. This suggestion is strengthened by the fact that gout traditionally flourishes on soil which is already sensitized to such allergic complaints as asthma, urticaria and eczema.

Evocative factors.—If the necessity for an underlying "diathesis" be acknowledged, the other factors to be discussed must be regarded as being in themselves of secondary importance. They include dietetic or Bacchanalian indiscretion and excess; fatigue, worry or exposure. There can be no doubt that over-feeding will provoke and exacerbate attacks of gout, rendering them longer, more frequent and more severe. It may also, when continued in some cases, provoke them when no heredity factor is apparent. Both these facts, as Violle⁵ pointed out, explain its class incidence in the past—the *morbus dominorum*.

On the analogy of those cases of gout proved by Garrod to have been due to lead toxæmia, some authorities have believed cases with gastro-intestinal symptoms to be due to a direct intoxication of the bowel depending upon incomplete protein digestion. The individual reaction to a protein-free diet is, however, extremely variable, and moreover the dietetic idiosyncrasies of the gouty subject often extend beyond the confines of the nucleo-proteins, as in the case of strawberries. The help of skin tests has more recently been invoked in the search for allergy, but these have so far proved disappointing.

Violle (1936)⁵ has pointed out that the "class-incidence" of over-indulgence in food and wine in France has changed and must now be looked for chiefly in the proprietors of workmen's all-night restaurants and in the caterers to public markets. In these classes he has noted an increase in gout. He points out, moreover, that in the peons of South America we have a practically exclusively meat-eating community, whereas the Laps and Esquimaux live almost entirely on fat. In neither

of these communities, he states, is gout known. It is in the consistent over-consumption of rich food and drink that he finds the danger to lie.

With regard to drink, it was pointed out many years ago by Allbutt that alcohol is not a synonym for wine, beer or spirits, but that in all these beverages, protein of some sort is either developed during the process of fermentation, or is added during the process of fining. The response of the gouty individual to these is extremely variable, and whereas some gouty subjects appear to be unaffected, Gupta⁶ has reported cases of gout among teetotallers, as well as vegetarians. Gout is made worse by a sedentary occupation, which presumably reinforces the effects of gluttony by slowing down the process of oxidation. Respiration in such persons is moreover usually shallow and abdominal in type and Roger and Binet (1922)⁷ were able to show that in such circumstances there was a deficiency in the final stages of protein metabolism.

Minor trauma, more especially when this is associated with wet and cold, as for instance when hunting or shooting, will frequently determine an attack of gout; and Hench⁸ has drawn attention to attacks occurring a few days after surgical operations of any sort. Although undue physical or mental fatigue will also determine attacks, it seems much less certain that sexual indulgence will do so, and it is possibly the confusion between gonorrhoeal arthritis and gout which existed previously which has led to this statement in textbooks.

The blood.—It was held by Garrod and most subsequent observers that a gouty subject was one whose blood uric acid gradually increased until at a certain level it was precipitated in the tissues causing the attack. Thomson and Gordon⁹, however, pointed out that the acute attack bears no direct relationship to an increase in blood uric acid as there is not a constant rise in this prior to the attack. Uric acid has, moreover, been injected into the veins of susceptible subjects without producing an attack, while in leukæmia the uric acid may reach higher values than in gout without producing signs and symptoms. It remains true, however, that in the gouty patient uric acid is retained in the tissues by means which are

not understood, and released and excreted during attacks. In view of the fact that clinicians have always been impressed by the extreme sensitivity of gouty patients to very small quantities of certain foods, Llewellyn's⁴ explanation of the mechanism of the local phenomena of an attack of gout is interesting. He postulated a sensitization of the endothelial cells in the neighbourhood of the joint which would remain latent unless they came into contact with a circulating antigen which might be of animal, vegetable or bacterial origin. When this happens an anaphylactic reaction occurs which liberates histamine bodies causing venous stasis with exudation. This would also explain "abarticular" (non-articular) symptoms such as asthma, eczema, urticaria and phlebitis. When this condition persists for long, tissues such as cartilage which have normally a poor circulation, undergo areas of ischæmic necrosis, and owing to their sodium content the blood uric acid gets deposited in these areas as sodium bi-urate in the form of tophi.

Whatever the final truth it would seem that the increased blood uric acid can to-day no longer hold the key-position ætiologically which it once did. Its chief importance now is for purposes of diagnosis either by blood estimations, or from the detection of tophi radiologically or clinically.

CLINICAL

A brief description of the acute attack is necessary for an understanding of chronic gout. It is usual to describe certain prodromes, such as an attack of flatulent dyspepsia, unaccustomed constipation, mental depression, irritability, headache and epigastric heaviness, or a feeling of congestion or itching of the skin over the joint to be attacked. In my experience, however, these are far from invariable, quite a common history being that the patient had felt unusually well on the day previous to the attack.

The patient wakes up, generally between 2 and 4 a.m., with pain in the affected joint which rapidly becomes acute. It then swells and acquires a red and shiny appearance which has been named "*peau d'oignon*." In addition the veins over the joint and those proximal show marked engorgement—sometimes for several days prior to the attack. At this stage the pain

is agonizing, the weight of the bed clothes or the vibration of a passing bus being well-nigh intolerable. After an hour or two the acute pain will pass off and the patient may drop off to sleep. The pain will be less severe during the next day until 5 or 6 p.m. when it will probably return, allowing the sufferer no rest again until early morning. This cycle may recur for a week or even more, the pain getting less intense towards the subsidence of the attack. In some cases the disease will progressively affect several joints in turn somewhat simulating rheumatic fever. The big toe is the first joint to be attacked in 73 per cent. of cases, the next most commonly affected being the tarsus, heel, knees and wrists. In severe cases ecchymoses may occur in the skin overlying the painful joint, whereas in all cases in which there has been much swelling desquamation will occur in some degree, and this fact may be of diagnostic value. A further point of some importance is that the maximum tenderness in the case of a gouty big toe joint will generally be found on the internal aspect of the joint proximal to the head of the metatarsal rather than over the joint line itself. The temperature is not generally raised during an attack of gout although this may sometimes occur.

When the initial attack of gout occurs, as is usual, in the spring, the second attack will often occur at the same season, one or two years later. As the attacks get more frequent, attacks will also occur in the autumn, and recurrences may occur which merge with the original attack.

Recurrent attacks may occur always in the same joint; or other joints may become progressively involved. In the former case the prognosis is the better, since although osteo-arthritic changes will ultimately occur and the joint will stiffen, the acute attacks will tend in time to burn themselves out and the patient is left merely with whatever limitation attaches to immobility of the affected joint. In the second case, in which the disease is progressive the onset may be perhaps in the big toe where the attack will run its usual course. Before he is free from pain, however another joint may start to swell and the cycle will be exactly repeated in five or six joints in turn, those most commonly affected being the big toe of the other

foot, the tarsal or metatarso-phalangeal joints, the tibio-tarsal joints, the knees (where considerable effusion generally complicates the picture) or the wrists. Occasionally the elbow joints are affected also, but more generally the olecranon bursa will be picked out and considerable tophi may be deposited there. In every succeeding attack all the previously inflamed joints will generally be affected, with the addition of one or more new ones. The inflammation dies down in the joints inversely to the order in which they were originally attacked, that is to say the joint originally attacked being in most cases the last to clear up.

When the invasion is polyarticular the individual attacks often cease to show the "clinical pattern" of gout, and the correct diagnosis may not be made. In these cases the larger the number of joints affected the less severe generally is the pain and the longer does it last. During the intervals between attacks the signs of arthritis do not clear up so completely, and the picture gradually approximates to that of chronic arthritis of other causation.

Chronic gout.—When chronic gout is not a sequel of acute attacks but manifests itself *ab initio* in this form the diagnosis can be made with certainty only when tophi can be found. Tophi may occur in the region of affected joints, in which event they are generally a late manifestation; or in certain cartilaginous areas, notably the ear, where they may occur much sooner. They have in some recorded cases given warning of the approach of gout several years before the onset of symptoms. Tophi occurring in the ear are therefore of considerable diagnostic significance and should always be carefully looked for. When there is doubt as to the nature of a lump on the pinna of the ear, it should be removed or aspirated and subjected to a microscopical examination for uric acid crystals, or a murexide test should be done for this substance. Tophi occurring in the neighbourhood of the joints or tendons are of more clinical importance than the preceding type, and will in many cases of chronic gout constitute the patient's chief disability. The questions of their removal in such cases will be considered later, but should not generally be advised when the

X-ray shows much destruction of the joint until it is ascertained that they are not performing a useful splinting function.

The colouring of the skin over a true tophus should be noted if mistakes are to be avoided. At the point of maximum pressure the skin is generally atrophic and thinned to such an extent that the white uratic deposit below can be seen easily. The surrounding skin is of a purplish red colour which is the legacy of chronic inflammation. In some cases the deposit will ulcerate through the skin and after discharging itself may heal up, although in other cases a chronic or intermittent sinus may remain.

The pain in chronic gout is generally much less severe from the beginning and seldom seriously disturbs sleep. On the other hand the attacks may last for weeks, or even months, and in the worst cases the joints do not become entirely free of symptoms, such as crepitation, swelling and stiffness, between attacks. When this stage is reached the diagnosis becomes difficult, and in some cases impossible to differentiate clinically from other forms of arthritis. When the border line between gout and rheumatism of this sort is indefinite, we are in danger of being driven back on to a term of which Garrod many years ago deprived us—on the basis of blood uric-acid estimations—namely “gouty arthritis.” It is generally held now that the osteo-arthritis which supervenes in these cases is of a secondary (traumatic) nature, but where the *basis* is chronic gout the term does seem to be justified. It is noticeable moreover that women are not infrequently sufferers of this type of “gouty arthritis,” and since the acute form is excessively rare in females, it is tempting to suggest that this may even be the typical manifestation of gout in women when it occurs.

When tophi are not found the other diagnostic methods to be employed will be (a) the history—a gouty “pattern” may emerge on close questioning with regard to the previous attacks, intervening periods free of symptoms, and predisposing causes. (b) Blood uric-acid estimations will be confirmatory of this condition when the values are much raised; when they are lower than normal this fact may be suspicious; when they are definitely normal the diagnosis is likely to be incorrect. (c) X-ray

examination in the region of the affected joints or of the hands, will in a case of chronic gout often show small punched out areas in the bone, which represent deposits of biurate crystals. It has, however, been pointed out by Bach and others that these may also occur in other rare conditions unassociated with gout such as benign lymphogranuloma, and Scott described them as a not infrequent finding in true rheumatoid arthritis. In general, however, they may be taken to be confirmatory of a diagnosis of gout when they occur.

"Retrocedent" and irregular gout.—Retrocedent gout is a term which is now seldom heard but which was previously applied to a condition in which sudden inhibition of an acute articular attack was followed by, or coincided with, the development of serious internal symptoms referable to the gastro-intestinal, cardiovascular, or nervous symptoms. In France it is still held to be dangerous to employ specific drugs in the first twenty-four hours of an attack, and it seems probable that this teaching is based on a surviving belief in retrocedent gout.

Symptoms such as dyspepsia, colic, diarrhoea and headache, do indeed alternate not infrequently with attacks of gout. It would seem rational in such cases to grant them and the articular manifestations a common etiology—possibly infective—but the belief that they can be held to represent vicarious forms of gout itself, is no longer tenable. It would moreover seem that this was the opinion of no less an authority than Sir Thomas Watson who writing on "gout in the stomach," a fashionable complaint during the Regency period, remarked "Vulgar bellyache taking rank by courtesy . . . gout in the stomach often under test of an emetic turns out to be pork in the stomach." When the symptoms of retrocedent gout are referred to the cardiovascular and nervous systems, it seems probable that they have their basis in the degenerative changes in those systems which are known to be frequent accompaniments of an advanced gouty state.

Irregular gout.—Certain clinical syndromes have from time immemorial been held to have gout as an etiological factor. Among these syndromes the best known are perhaps lumbago, sciatica, rheumatoid arthritis, Heberden's nodes, dyspepsia,

phlebitis and certain eye troubles such as iritis and hæmorrhagic retinitis. Osler wrote that he had been taught that there were 39 morbid entities which might be due to gout, whilst Sir Spencer Wells (1854) considered that most of the nervous diseases of women "especially those usually considered as hysteric . . . frequently arise from the presence in the blood of impurities which are the true characteristics of gout." Still further back Benjamin Rush (quoted by Llewellyn) writing about the year 1819 stated that "a distressing collection of air in the rectum which renders a frequent retirement from polite company necessary to discharge it is likewise a symptom of gout"! Trousseau was a firm believer in irregular gout and drew an analogy with syphilis in which entities so much differing from each other as periostitis, alopecia, keratitis, roseola, chancre and bubo can be proved to be varying manifestations of the one disease—"Syphilis in different garbs." He held that the morbid process typical of gout was an inflammatory reaction followed by the deposition of urates, and that this could occur anywhere, the region of the joints being merely its common site. In England, Sir Joniathan Hutchinson was the most able exponent of this theory.

With regard to the etiological significance of gout in those ocular disorders which have been mentioned, very little has been written in critical vein. It was the opinion of W. M. Beaumont (1920), however, that it is unwarrantable to speak of gouty eye disease, for there is nothing in the character of the inflammation specific of gout. An exception may perhaps be made in favour of the catarrhal conjunctivitis often seen in gouty subjects which generally disappears at the onset of an acute attack.

Rheumatoid arthritis has now passed beyond the suspicion of a gouty etiology, whereas Heberden's nodes can safely be assigned to the osteo-arthritic category. Phlebitis and dyspepsia can generally be explained even in a gouty patient without having to evoke this disease itself as an etiological factor although they still appear in most textbooks as sequelæ of the disease. Some cases of lumbago and sciatica, however, cannot be so summarily divorced from a gouty etiology. My opinion that a gouty background is the important factor

behind a very considerable number of cases of fibrositis of all sorts, is shared by such competent observers as Ray, Hench and the late L. J. Llewellyn.

During an acute attack of gout, fibrositis in varying degree is almost invariable, and it will scarcely be disputed that both gout and lumbago occur more commonly and more periodically in gouty than in non-gouty subjects. Cramps at night and muscular stiffness in the early morning are also frequent accompaniments of the actual myalgia. Such cases do not however, differ clinically from those of infective etiology, and only the final test of successful therapy will serve to distinguish them.

When we come to the non-articular and muscular conditions which are particularly common in the course of chronic gout we find that the incidence of eczema and angioneurotic oedema is agreed to be high, whereas dyspepsia and local oedema, which often simulates cellulitis, are found in a majority of cases. Renal complications, myocarditis, and a degenerative condition of the arteries are undoubtedly, but not invariably, associated. It would seem therefore if we examined the physiological basis of those symptoms which most frequently accompany gout, that the essential lesion of the disease is a localized oedema which may occur in or around joints, muscles or the skin. This may be followed sometimes quite rapidly by a deposition of urates. In a non-gouty person with such a syndrome suspicion would at once fall upon the gastrointestinal tract, and indeed the majority of sufferers with gout will confess to dyspeptic symptoms which often are made worse before an attack of gout. The circulating urates contained in the blood may possibly be assumed to hasten the degenerative processes mentioned, which affect chiefly the cardiovascular and renal systems.

It seems that after a close observation of a considerable number of cases of gout in all stages that the term "inflammation" as applied to the gouty joint is a misnomer. It would appear that the condition is in reality a local condition of oedema which follows as the result of slight trauma, a general condition of congestion of the affected limb.

The fact that gout is practically confined to the lower limbs

and the hands is thus explained in the first instance by the effect of gravity on the congestion, and in the latter case by over-use (trauma). The fact that the veins leading from the affected area are unusually swollen both before and during an attack has frequently been recorded, whereas if the observer will gently press the column of blood in these distended veins backwards towards the affected part several times he will not infrequently be able to provoke twinges of acute pain in a joint which appears otherwise to be past the attack.

The cause of this venous engorgement may perhaps in the lower limbs be found in the relative stasis of the portal venous system described by the French observers under the term "hepatisme" this being no doubt due in its turn to some dietetic idiosyncrasy.

DIAGNOSIS

When a history of arthritis is given which affects chiefly the lower limbs or hands and which tends to recur periodically leaving no trace in the joints during the interim, gout should be suspected. This diagnosis will moreover become more probable if the patient is a man, and it can be elicited that attacks are provoked by dietetic indiscretion or excess of any sort. Gouty attacks tend to be seasonal, occurring in the spring and autumn, and one, two or three joints are generally affected, although further joints may be involved in subsequent attacks; one or both big toes being usually but not invariably affected (podagra). It has been pointed out in this connection by Hench⁸ that when a big toe is involved that the maximal tenderness is generally on the mesial aspect of the metatarsophalangeal joint and not over the joint line. I have found this to be true in practically all cases. It is noticeable that attacks of acute and also chronic gout may be provoked in susceptible persons by relatively trivial trauma and that fatigue or exposure will noticeably increase this liability. When a tophus in the ear or elsewhere can be found, the diagnosis can be considered as settled, but even when these are absent an olecranon bursitis may be found, and since this is five times more common in chronic gout than in other forms of arthritis, its discovery will afford some circumstantial evidence of gout.

The value of blood uric acid estimations and of X-ray

examinations has already been discussed.

Differential diagnosis.—When a subacute polyarthritis occurs in a middle-aged man who has only a doubtful family history of gout, the differential diagnosis will obviously present difficulty. The conditions most likely to suggest themselves will be rheumatic fever, which often starts in this way when it occurs for the first time in middle age; infective arthritis, either due to the late results of gonorrhœal infection, or due to an infective focus elsewhere in the body; and rheumatoid arthritis which, although much commoner in women, can occur in males. In addition, cases of gout are very uncommonly seen in which the only manifestation is an area of bluish-red œdema generally over the tarsus or carpus; such cases are sometimes diagnosed as a low-grade cellulitis and wrongly incised.

When subacute rheumatic fever is suspected, an absence of any pyrexia will favour a diagnosis of gout. A very careful history must be taken, and it must not be forgotten that for a large section of the laity the terms “rheumatism” and “gout” are synonymous. Such cases, however, not infrequently continue under the “rheumatic” label until tophi subsequently appear. An X-ray at this stage is unlikely to help much. Scott has, however, pointed out that in all doubtful cases, at any stage, more value is likely to attach to an X-ray of the hands and wrists than of any other joints, since when gout attacks the larger joints it very frequently leaves no radiographic evidence of its visit. Small punched out areas in the carpus, wrist or fingers may be found even if these joints have never suffered clinically. Such a finding would be conclusive evidence of gout.

Infective arthritis should never be diagnosed in the absence of clear evidence of infection until gout has been eliminated as an alternative, whereas even the discovery of a focus of infection cannot of itself eliminate the possibility. There seems to be no doubt that many of the cases described by the ancient authors must be considered in the light of modern knowledge to have been examples of gonorrhœal arthritis. The history, however, of recurrent and more or less periodical attacks between which all pain and stiffness of the joints com-

pletely cleared up points strongly to a diagnosis of gout.

Rheumatoid arthritis occurs generally in women of the asthenic type of body, the disease being of insidious onset preceded by months, or even years of premonitory ill-health with fatigue, palpitation, and loss of appetite and weight. It is not this type of patient that is generally the victim of gout.

It is generally stated that the blood pressure is raised in the gouty patient, and if so this would constitute a further differentiating point; my own opinion does not confirm this observation, at least in the case of the majority of chronic sufferers. A more reliable observation will consist in noting that the joint involvement in rheumatoid arthritis tends to be bilateral and symmetrical, whereas in gout this finding would be exceptional, as it would also in rheumatic fever and infective arthritis. Ray¹¹ has drawn attention to those cases of chronic gout in women who show a chronic thickening of the first two metacarpo-phalangeal articulations and sometimes of the mid-phalangeal joints of one or two fingers. These cases are frequently mis-diagnosed as rheumatoid arthritis. Finally, it must not be forgotten that mixed cases of gout and arthritis of any type may occasionally occur.

TREATMENT

It seems unlikely that what Sydenham termed "a radical cure, one altogether perfect, whereby the patient might be freed from even the disposition to the disease" will become possible until the metabolic derangements underlying the gouty diatheses are understood more clearly. It is possible, however, even to-day to prevent the occurrence of clinical gout in cases in which the familial tendency is known to exist, and to control the various factors which influence clinical attacks, and also the attacks once they have appeared.

The treatment of chronic gout will lend itself to consideration under the headings of (a) infection, (b) food, (c) drink, (d) medicines, (e) physical treatment, (f) spa treatment, (g) exercise and hygiene, (h) place of residence.

Infection.—The search for an infective focus in the teeth, tonsils, gastro-intestinal tract and prostate is as important in gout as in those types of arthritis in which infection is believed to be the sole etiological factor. No dead tooth

should be allowed to remain, even though it be performing some useful mechanical task such as anchoring a bridge or a plate, since such teeth are invariably infected at their roots, and it is impossible to be assured that such infection is neither causative nor contributing to the metabolic disorder. The gastro-intestinal tract of the gouty patient is notoriously abnormal in a majority of cases and must generally be suspect until it can be acquitted. When it is considered that the intestinal flora is abnormal, colonic lavage is a rational procedure, and its subjective value often appears to be considerable. When a definite infection can be found anywhere it will have to be eradicated, often surgically, whilst vaccine treatment in such cases may have value.

Diet.—No standard dietary will serve the therapeutic purpose of all patients with gout. Certain general principles may, however, safely be enunciated¹ the diet must be a balanced one since, as Mellanby has shown, the undue restriction of one of the three necessary classes of foodstuffs will bring about profound metabolic disturbance, and this is obviously undesirable in a disease which is itself metabolic in origin. It is perfectly correct to endeavour to eliminate certain protein foodstuffs of animal origin the end product of which is uric acid. but if this is done other forms of protein which will often be of vegetable origin must be substituted. It should moreover be remembered that when vegetables are boiled rather than steamed, their mineral content is seriously depleted, and there is no doubt that this is a matter of importance.¹¹ The digestive history of each patient must be studied separately since certain patients will be found to be intolerant of certain articles of food which may be innocuous for other patients. Those patients who complain of definite dyspepsia must be treated on general dietetic and other principles for this and when achlorhydria is present should receive attention. Certain gouty patients are prone to oxaluria which needs separate consideration constituting as it does a definite clinical syndrome. In general it may be said that moderate dietetic restriction will be of value in the majority of cases, although actual fasting should not be recommended. In patients in whom gout appears after the

middle-age it is also generally inadvisable to alter the dietetic and other habits of a life-time too rapidly.

On general principles the food should be as fresh and as simply cooked as possible, made-up dishes and fried food being avoided. Certain patients will know already that they are sensitive to certain types of food such as shell-fish, and these must naturally be avoided. The use of skin tests for determining sensitivity to certain classes of foodstuff has been advocated by Gudzent and others, but the results reported in this country have been disappointing.

Protein.—Certain foods contain a large quantity of nuclein which is a precursor of uric acid and so should be avoided by gouty patients. Such foods are liver, sweetbreads, kidneys, fish-roe, and to a less extent brains. Among other articles which these patients are wise to avoid are beef, pork, wild duck, goose, game (which has been hung), salmon, meat-soups, lentils, haricot beans and an excess of coffee or tea. Violle⁵ states that the younger the meat or vegetable the greater its uric acid yield; if this is true lamb is for instance obviously less desirable than mutton, and new peas less wholesome than those served later in the season. Meat should, if possible, be limited to one meal a day, whereas one day a week may well be entirely meatless, cheese being substituted. Most forms of fresh fish are suitable for the gouty patient, although the white-fleshed varieties are the more easily tolerated. There seems to be no reason to exclude oysters in moderation, as is often done.

Carbohydrates and fat.—There would appear to be no good reason for the traditional exclusion of carbohydrates from the diet of the gouty patient in the absence of amylaceous dyspepsia. It has indeed been shown recently in America¹² that when the protein intake is constant a high carbohydrate and low fat diet is best for these patients. Wholemeal bread by virtue of its vitamin B content is better than white bread; whereas although fat of animal origin is best reduced to a minimum, an ordinary allowance of butter may be sanctioned.

Gouty patients must be encouraged to eat the green leaf vegetables with the exception of spinach, since not only do they constitute bulk without much nourishment, but they provide

the body with the inorganic salts which it needs. Lastly, but not least, they leave an alkaline ash, and so like fruit, leave the body less acid than before. The root vegetables are less suitable, whereas peas, beans and lentils should be allowed only in the strictest moderation. All fruit which is really ripe may be allowed with the exception of rhubarb and strawberries. Condiments by stimulating the appetite conduce to overeating, and are also in the majority of cases gastric irritants. Most authorities further advise that patients with gout should limit their intake of salt to that which is normally found in cooked food.

Drink.—An increase in the fluid intake to 5 to 6 pints in the day is very desirable, although it is best for the actual meals to be taken dry, as the appetite is sooner satiated in this way and so a restriction of the diet more easily achieved. Water taken hot is said to be preferable to cold owing to its power of promoting biliary excretion. Vichy water being alkaline should be used for preference. Although alcohol is not the sole cause of gout or even in my experience the most frequent cause of exacerbations, it would seem advisable that the children of gouty parents should be brought up as total abstainers, while in the case of the gouty adult, abstinence should be suggested. When the patient is elderly and of fixed habits, however, strict moderation rather than abstinence may justifiably be advised unless it appears that attacks are in any way directly influenced by drink. All wines and beers should by virtue of their extractives, rather than their alcoholic content, be advised against. When alcoholic refreshment is insisted upon, it is generally agreed that the safest form in which to take it is gin or whisky well diluted. Gout, can, however, contrary to belief sometimes be provoked even by these liquors.

Medicinal.—That the alkalis are useful in chronic gout has been known for many generations, although it is now generally believed that they exert their beneficial influence on the disordered digestion of the sufferer rather than upon his tophaceous deposits, as was formerly believed. Ordinary sodium bicarbonate, mixed if so desired with potassium citrate, taken occasionally in such doses and over such a period as to alkalize the patient's urine will be found a useful procedure if repeated

every few weeks. Lithium salts were formerly much in vogue for this purpose until it was pointed out by Luff that they might also produce a condition of extreme cardiac depression. The tendency in chronic gout is towards constipation and a morning dose of saline is advisable. This may, if wished, be added to one of the hexamine solutions such as piperazine or uralysol.

When the joints remain constantly puffy or painful, or where much fibrositis is complained of, potassium iodide is often of value, and a few minims of tincture of colchicum or some sodium salicylate may reinforce its effect. Colchicum although of great value in acute gout has, however, not a wide field of usefulness in the chronic forms. Guaiacum was the favourite drug of Sir Alfred Garrod, generally in combination with sulphur. His prescription was as follows:—

Pulv. guaiaci.					
Sulph. precipit.					
Potass. bitartrate	-	-	-	āā	60 grains
Pulv. tragacanth co.	-	-	-	-	120 grains

Fiat. pulv. $\frac{1}{2}$ to 1 teaspoonful to be taken at bedtime in milk or water.

Atophan although it is practically specific in many cases of chronic gout is mentioned last in view of the dangers which may attend its use. A condition of poisoning not unlike acute yellow atrophy, will follow its prolonged administration, and even sometimes after moderate doses. It is said to act by increasing the elimination of uric acid from the blood stream via the urine. If this drug is used it should be given in doses of $7\frac{1}{2}$ grains, two or three times a day for not more than three days, and this may be repeated in 10-15 days. Many proprietary remedies now consist of or contain atophan, and great caution should therefore be exercised in recommending any such preparation of which the constituents are unknown to the prescriber. Among these preparations may be mentioned agotan, quinophan and gorun. According to Willcox, atophan should never be allowed to a patient over 50 years of age or when there is any suspicion that the renal function is poor.

Physical methods.—In the chronic and irregular forms of gout it will often be found that a patient will benefit considerably if a profuse perspiration can be induced. Unless this perspiration is compensated for, however, by the ingestion of plenty of fluid during the course of the treatment an acute

attack of gout will sometimes be produced. Patients who propose to take a course of Turkish or radiant heat baths must therefore be warned of this.

Heat may also be applied locally to affected joints, and it will often be found that moist heat from a poultice, anti-phlogistine or a steam chamber is more efficient than dry heat, such as provided by radiant-heat or infra-red lamps. Some cases are made less comfortable by heat and compresses soaked in evaporating lotions must then be used. When the circulation of an extremity is sluggish a useful procedure is "contrast bathing"—immersing the limb alternately in hot and cold water several times a day, and subsequently gentle massage will also be of value.

For the local treatment of tophaceous deposits no external application is of any value as a solvent. Ionization with lithium chloride or sodium salicylate is thought by some observers to be of value.

Surgical treatment of tophi.—When large discrete uratic deposits occur which while impairing the movement of the joint can be shown radiographically not to open into the joint, the question of operative removal may arise. Contrary to the old belief the wound will heal well in most cases. It must be remembered, however, that these deposits are seldom so localized as they appear, and generally infiltrate the fascial planes of the surrounding muscle groups. When they affect a tendon, operation should not be attempted.

Spa treatment.—This should only be advised in the chronic phase of the disease and should never be of a stimulating nature. Radio-active waters often seem to have a beneficial effect although improvement where it occurs will generally do so after a preliminary "stir-up" of variable intensity. In England Bath and Buxton possess the most suitable waters, and the somewhat relaxing climate of Bath is for these cases an additional advantage. The patient should stay for at least four weeks, during only three of which will he receive active treatment. Among foreign spas most suitable for the gouty patient are Aix-les-Bains, Contréxeville, Badgastein and Wiesbaden.

Exercise and hygiene.—Most sufferers with gout are of a

sedentary habit, and it is generally agreed that coincidentally with decreasing the patients gastronomic activities that his physical activities should be increased. Exercise to be beneficial must, however, be regular, since when it is spasmodic it may act as the determining factor of an acute exacerbation of the disease. When the lower limbs are affected to an extent that makes walking difficult, this may be substituted in various ways, such as a rowing-machine, punch-ball or an apparatus such as is frequently used for increasing the chest expansion. Gouty patients must lead regular and rather unexciting lives. Fatigue is a great enemy as is also worry. Their clothing should be warm, but allowing for evaporation since dampness of the underclothes will cause chilling and so exacerbate the condition. Light woollen, silk or "cellular" fabrics are the best; cotton or flannel being undesirable. They should wear warm woollen socks and should always be well shod.

Finally, a word as to *climate* and *environment*. An equable climate is a necessity, rapid changes sometimes apparently provoking acute attacks of gout. A warm climate suits many but by no means all sufferers. With regard to the house in which the victim of chronic gout should live, Llewellyn⁴ was wont to give the following advice—"live on a well drained gravel soil on a slope sheltered from the North and North-east winds . . . and cultivate cheerful neighbours"!

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RADIO-ACTIVE VASELINE A NEW TECHNIQUE FOR SURFACE RADIUM THERAPY

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DURING the past four years an attempt has been made to treat cases of congenital nævi by the local application of ultra-violet rays. A fair measure of success was obtained with superficial vascular lesions which could be easily blanched by gentle pressure of a glass slide on the skin. Deeper vascular nævi which fail to blanch on pressure responded poorly to this treatment. As a result of these observations it was concluded that it would be advantageous to produce a reaction in the depth of the vascular tissue. Ultra-violet rays are limited in their power of skin penetration and the presence of vascular zones of dilated blood-vessels, associated with cases of nævi, still more reduces penetration and limits biological action to the superficial layers of the skin. Radium affords a means of obtaining reaction within the depth and through the skin structure. Many experiments were planned, but as a final result, a technique of treatment by radio-active ointments was selected. The object of treatment was to obtain a medium of regular adhesion which could be evenly distributed and applied over an irregular skin contour and still give a constant intensity of irradiation and constant biological reaction. Several vehicles were investigated, gum solutions, rubber solutions, Canada balsam, linseed oils, other heavy vegetable oils, beeswax, resins, paraffin wax, but finally it was found that a low melting pure vaseline gave the best practical solution.

METHOD OF PREPARING RADIO-ACTIVE VASELINE

For this purpose, radon supplied in glass capillary tubes of known intensity was dissolved in melted vaseline. Ten to twenty c.cm. of melted vaseline at 45° C. was drawn up in an all-glass syringe and this was placed into a warm vessel. A known intensity of radon, i.e. from 10 millicuries to 20 millicuries was obtained in a sealed glass capillary by the kind assistance of Dr. W. L. S. Alton and Dr. A. E. Southern of the Radium Institute, London. A 2·0 c.cm. glass syringe was warmed and a piece of fibre containing a number of fine perforations made by pricking with a pin was

tightly jammed into the bottom of the cylinder of the syringe. The piston was applied and the syringe was filled with melted vaseline. The capillary glass tube of radon was inserted in the barrel of the syringe filled with vaseline and was manipulated so that the syringe was absolutely free from air bubbles but full of melted vaseline and the sealed radon glass capillary. The nozzle of the syringe was then buried into the remainder of the melted vaseline in the glass vessel and the capillary of radon was crushed and broken by forcibly pushing down the piston against the perforated fibre disc. The piston was pulled up and down consecutively filling and emptying the syringe of melted vaseline and so dissolving the radon into the known volume of vaseline. It is imperative that this process is absolutely air-tight and no air bubbles may be allowed to enter into the syringe or the melting vaseline, for this would cause rapid loss of radon. By this means a known intensity of radon was dissolved into a known volume of melted vaseline.

BIOLOGICAL REACTIONS OF THE SKIN

In early experiments this radio-active vaseline was applied directly to the skin. A measured volume, i.e. 1 to 2 c.cm. of vaseline was applied to a measured area of skin.

Preliminary experiments.—A circular disc one inch in diameter was cut out of a piece of adhesive strapping, this was applied to the anterior surface of the thigh thus exposing a circular area of skin one inch in diameter. A measured volume of radio-active vaseline was evenly spread over the skin area. This was then covered by a piece of tinfoil and kept in position by elastic adhesive bandage. The radio-active vaseline was left on for four days and then removed. The following results were observed :—

Circular skin area = 1 inch in diameter was covered by 1.0 c.cm. of radio-active vaseline containing :—

0.25	millicuries	of radon	per c.cm.	= no reaction of skin.
0.5	"	"	"	= faint erythema of skin, disappeared after 7 days.
1.0	"	"	"	= erythema with desquamation of skin. Hair may be lost. Reaction from 7 to 21 days. (Irritation felt.)
1.5	"	"	"	= erythema followed by desquamation and loss of hair. Reaction from 7 to 28 days. Intense irritation.
2.0	"	"	"	= erythema followed by œdema, swelling and ulceration of skin (took 6 to 8 weeks to heal) scarring but no telangiectasis seen after one year.

A definite skin erythema reaction is obtained with dosage

equivalent to 1.0 millicurie of radon dissolved in 1 c.cm. of vaseline spread over a circular skin area of one inch diameter.

PHYSICAL MEASUREMENT OF INTENSITY OF RADIO-ACTIVE VASELINE

Dissolving 5 to 10 millicuries of radon in 10 c.cm. of melted vaseline made the vaseline fluorescent in the dark. This fluorescence was an easy method of testing the efficiency of the solution of radon in vaseline, a uniform bright greenish-blue fluorescence is emitted when viewed in the dark. The fluorescence persists brightly for four days and then gradually weakens. Physical measurement of solution of radon in vaseline was carried out by Dr. Alton and Dr. Southern. Investigation by means of the electroscope showed that radio-activity was present, and roughly less than 20 per cent. of the initial activity was lost in the process of solution, and a gradual decay of radiations was observed.

PRACTICAL APPLICATION OF RADIO-ACTIVE VASELINE

The practical application of radio-active vaseline directly smeared on to the skin, at times, showed disadvantages. In cold weather a satisfactory uniform skin erythema reaction of the skin would result but in warm weather and in warm areas of the body, the vaseline would liquefy and settle by gravity and as a result an irregular skin reaction would often be seen. This occurred when the vaseline was applied to skin area of irregular contour, i.e. the side of the orbit or chin. Efforts were therefore made to improve the adhesive qualities of the vaseline. Paraffin wax and beeswax were added to the vaseline in varying proportions to increase the melting point and avoid liquefaction. Efforts to spread the radio-active vaseline on to pieces of gauze and cotton canvas were attempted, but all these experiments greatly weakened the radio-active properties and have been discarded. Finally a technique was designed by which the radio-active vaseline was placed into small envelopes of cellophane and the flap was sealed down by a special solvent. This was a great improvement and of great

advantage in practical application.

RADIO-ACTIVE VASELINE IN CELLOPHANE ENVELOPES

When 10 to 20 c.cm. of radio-activity vaseline has been prepared by the technique previously described, 2.0 c.cm. was withdrawn into a warmed glass graduated syringe and inserted into a cellophane envelope, 2 by 1 inches in size, the flap of the envelope was sealed, and in all, five to ten cellophane envelopes each containing 2.0 c.cm. of radio-active vaseline were prepared, each was allowed to solidify and held ready for application. The cellophane envelope was applied to the skin area, covered by a piece of tinfoil and then attached to the surrounding skin by pieces of adhesive strapping half an inch in width. This was kept in place for four days and then removed. This method of application is a great advantage for regular and uniform reaction of the skin results and with controlled dosage the reaction of the skin is consistent and can be accurately repeated.

Cellophane envelopes measuring 2 by 1 inches each containing 2.0 c.cm. of vaseline in which was dissolved :—

0.25	millicuries	of radon per c.cm.	= no reaction of skin.
0.5	"	"	= mild erythema of skin, disappeared after 7 days.
1.0	"	"	= erythema of skin, desquamation, reaction lasts four to five weeks, exfoliation and loss of hair.

The skin reaction caused by the application of radio-active vaseline can be helped by subsequent application of erythema doses of ultra-violet rays. This accelerates the erythema reaction and the final healing of the skin. This method of application of radio-active vaseline is of practical therapeutic value. A dose of 0.5 millicuries per c.cm., or stronger dosage, 1.0 millicuries per c.cm. have been employed. The alpha radiations are absorbed by the vaseline, soft and hard beta radiations are possibly the effective radiations acting on the skin surface.

CLINICAL RESULTS

Cases of congenital nævi, hypertrichosis, sycosis barbæ and skin papillomas have been treated. The results in the treatment of congenital nævi are hopeful. Early cases in which the

vascular thickening is of milder and paler degree improve after the first treatment. Repeated application may be necessary at intervals of five to six weeks. In these cases treatment has been augmented by subsequent applications of erythema doses of ultra-violet rays. The extensive and deep seated nævi need stronger dosage of radio-active vaseline. A full erythema reaction with exfoliation and loss of hair of the skin is attempted with each treatment. The beneficial results of treatment are apparent three or four weeks after treatment. Cases of hypertrichosis of the skin have given good results. After the application of radio-active vaseline a full erythema skin reaction followed by exfoliation of the skin should result. The skin desquamation is most apparent and begins at the hair follicles. The erythema reaction persists for two or three weeks and weakening of the growth of hair with partial depilation results. The treatment is of great help to patients and they are much encouraged when they realize that they have had no need to attempt to remove hair by shaving or other means. Cases of sycosis barbæ respond very well following a single treatment. A mild erythema reaction of the skin should be obtained. The hair follicles are partially removed and complete healing is seen in successful cases within three to four weeks after initial treatment. These cases have had erythema doses of ultra-violet rays applied one or two weeks after radium treatment. Some isolated cases have given excellent results. Isolated warts and papillomas of the skin have been successfully treated during observation on the reaction of the horny thickened skin surface.

The application of radio-active vaseline prepared in cellophane envelopes affords a new technique for surface radium therapy. The solution of a known intensity of radon into a measured volume of melted vaseline gives a constant type of radiation and uniform biological reaction of the skin, resulting in erythema and exfoliation. This is due to the action of the beta and possibly other radiations. The technique is of advantage as an irregular skin surface can be uniformly irradiated and produce constant reaction. The dosage can be controlled and constant skin reaction can be repeatedly obtained.

GENERAL PRACTICE

XII—FEES

By I. G. BRIGGS, M.R.C.S., *Barrister-at-Law.*

THE case is ended. The fee has but to be fixed, and . . . collected. The young practitioner will find the fixing presents peculiar difficulties, while the collection is usually slow, often impossible. The average percentage of private accounts collected (assuming every consultation or visit to be strictly recorded) varies from sixty to about eighty-five; roughly seventy-five per cent. would be a fair figure for the average private practice. No ordinary business could possibly keep out of the Bankruptcy Court for long on such figures. Moreover, it is doubtful if more than five per cent. should need to be allowed by a business-like medical man.

Why then the difference? The difference arises simply from confusion of thought. The general practitioner cannot make up his mind that he is simply a business man, supplying a given need to the community, and requiring a given price. If he is, he is entitled to the arranged price, at a convenient time. If, on the other hand, he is not a business man, but a philanthropist, a gentleman, who is on this earth merely to do good, presumably in the expectation of a reward hereafter, then if his accounts are not paid, he has no reason to grumble.

At a meeting of a Local Branch called to consider a Club scheme, one woman practitioner spoke at some length on the relation of cheese to dyspepsia (what this had to do with Clubs was not clear), while an old doctor thought Clubs would be a good idea, as: "If I had what was due to me, I could place over ten thousand pounds in my pocket, and retire to-day as I ought to have done over ten years ago." This man definitely wanted the money, he had an undoubted right to it, but had, in effect, been swindled out of ten thousand pounds simply because he lacked either the nerve or the technique to collect cash due. He was a gentleman. The next speaker, a youngish doctor said: "I have a wife and family to keep, and when patients come to me I ask them for the money: if they can't or won't pay me, let them go to Dr.

Brown. I don't want them. Nor do I want clubs to lower prices so that unbusinesslike men can be sure of a little money; if they want their money, let them ask for it as I do, and refuse to treat those who will not pay; if they do not want their money, I envy them." This was the business-like view, and one noticed a positive shudder permeate the meeting. It was felt that such things were "not done among the best."

Now the young practitioner has to make up his mind at the very start to which school he will adhere. One cannot press for cash when personal accounts are pressing, and act the grand seigneur at other times; patients soon know whether a practitioner is one who expects payment or one who will go on sending in polite bills, quarterly, till Doomsday.

THE BUSINESS SCHOOL

A member of the business school can easily be recognized. He gives patients every ounce he has in him; no trouble is too much; he attends calls with the utmost promptitude, including night calls, he dispenses his own medicines and is not mean with regard to "extras" (a few tablets or a little ointment), he takes great trouble to know everything he can reasonably be expected to know not only with regard to his profession but with regard to local hospitals, institutions of various kinds, crèches, societies of all sorts, convalescent homes, baby adoption and a thousand and one things that are extremely useful to his patients. Having most conscientiously attended his patient, he expects to be paid, and makes such expectation politely clear: if the people are obviously too poor to pay, he accepts such fact and decides *forthwith* whether to continue attending without charge, or to refer them to the medical officer of the Public Assistance, but he sends in no account in the hope (usually, and rightly, vain be it said) they will deny themselves some necessity in order to pay him. If, on the other hand, the patient can apparently pay and shows no desire so to do, the business-like practitioner attends him no more. He must have bad debts, all doctors must have bad debts, but it is logical to try to ensure that bad debts are individually as small as is reasonably possible.

There is no need for impoliteness or even abruptness; one

is a medical practitioner, not a bailiff, but one is entitled to be paid, and once patients grasp that point, they come with the money, or with a statement that it will be paid later (this in reference to industrial practices), or they do not come at all.

At a surgery consultation I hand over the medicine and say quietly and politely: "That will be half-a-crown (or whatever the fee is) please!" and it is usually paid, or one is asked: "Will Friday do, Doctor?" To that there is but one answer, Friday will do. At a visit, one waits a moment or two, and some reference is usually made, by the patient, to the matter of the fee. If not, it is simple enough to state the amount quietly and politely, and say, if you wish, that payment avoids the difficulties of book-keeping.

There is a psychological point to the matter also. People value more highly advice paid for than advice given gratis: their friends can tell them they have a sore throat, "like I had last summer," but they come to a professional man to learn precisely what that sore throat is and what it may mean, and for such information and treatment they expect to pay. If they pay, they are likely to keep up treatment carefully and to take medicines which have cost hard-earned cash. If they get advice and medicine, in effect, free, they are likely to treat it negligently and, if the treatment is not immediately successful, they will try another practitioner (who probably will make a charge), and not only has money been lost, but a patient, for no one likes to pay an account for something that has proved useless. Further, if they owe you money, they have to excuse themselves for not paying what is due; this is most easily done by telling, first themselves, and then the neighbours, that you are a useless doctor who did them no good (this soon becomes—you did them positive harm) and you are likely to lose not only those patients but others also. If they have paid, they have no particular grouse, and are much more likely to keep their unflattering opinions to themselves.

SIZE OF FEES

The next point is, what fee is to be charged? To this there is one answer, the fee usual to the district, and this should always be the lowest fee common to the district, unless you have

specialist knowledge or have done work distinctly out of the common. People do not like to pay a very low fee, they feel they are not getting value for money; they do not like to pay the highest normal fee for they feel they are being "done": if 7s. 6d. is the normal fee, it is unwise to charge 10s. 6d. at a house that seems a little larger than the normal. At 7s. 6d. the house will be retained, at 10s. 6d. it is likely that the house will be lost. Few people nowadays have much spare cash, and those that have are very apt to hold very tightly to it against a rainy day; few people are insured against a doctor's bills, and the smaller the bill the more rapidly it is likely to be paid.

The only way to find out what is the usual charge is to ask fellow practitioners. This is a pity. I have often felt that each Local Branch might spend £1 per member in getting an Ordnance Survey Map of the district for each member, finding out by a brief questionnaire the charges made by members in each district, settling a fixed charge, checking this with the ratable values (from the local authorities), and colouring the maps to show the charges. I would even have the Branch advertise the charge per ratable value in the local newspaper once a month. Every practitioner would then know exactly the proper charge, every patient would know what he had to pay. I would go farther. I would have the British Medical Association draw up a series of accounts, print and sell them to medical men, with a brief reminder, gradually getting stiffer, for say four accounts, after which the matter could be written off, or better still, handed to a British Medical Association special department to endeavour to collect. Method of this sort, with suitable publicity, on a national scale, would gradually educate the public to the idea that medical men expected to be paid, and would try all ethical methods to attain this end. The public expect to pay solicitors and accountants, there is no logical reason why they should not pay medical men, or be prepared to render an excuse for non-payment which the doctor could consider. The public need educating to the idea that the doctor ought to be paid, not that he should be paid if they feel like it.

In an industrial practice, 2s. to 2s. 6d. for a surgery consulta-

tion, 3s. to 3s. 6d. for a house visit is the rule. Slightly lower charges, say 6d. less, are often made when the illness runs on beyond a few visits. This method should apply to house visits only; the surgery visit should be a fixed sum.

In better class practices, 3s. 6d. and 5s., 5s. and 7s. 6d., and 7s. 6d. and 10s. 6d. are normal; guinea patients are uncommon in ordinary general practice.

BOOK-KEEPING

A rigid but simple system of book-keeping is absolutely essential. I keep records of every patient on an ordinary 6 in. by 4 in. plain ruled card. Name and address with birth date, number of children, married, single or widow, and occupation are placed at the top. One entry suffices for several years, and the card can instantly be taken from the file when needed; further, a call while out, simply means the maid getting the relevant card and placing it upon the desk. A small ledger stamp puts in the date, the details and medicines are recorded, and payment, if made. If the patient leaves the district or dies, the card can be placed in a "suspense" file. There is no possibility of dispute, no re-writing every week or month a long list of names, no weird hieroglyphics. The cards can be placed (together with any panel cards) in a clip in geographical order, and visiting is made simple. If there is a dispute about an account it can be re-submitted in full detail in a few moments; if called as a witness, the practitioner can refresh his memory without difficulty, and even refer to the card in Court. If, unhappily, legal proceedings become needful to recover fees, such a card is proof that takes a great deal of upsetting.

Next a small day-book, with three cash columns should be bought, about 7 in. by 5 in. is ample, with about one hundred pages. The first column is for the date, the second for the name, the first cash column for "Cash paid at visit," the second for "Amount owing," the third for "Accounts paid." These can be entered in the surgery during hours, and from the visiting cards immediately on return. At any time the total sum taken (columns 1 and 3) can be seen, and the total amount outstanding (difference between columns 2 and 3). The

entries from columns 2 and 3 are entered (I do it at the time, it takes but a moment) on ledger cards, 6 in. by 4 in. ruled with a debit and a credit side. The name and address are placed at the top, the amount due (or paid) in the left (or right) column, and the day-book page in the little column immediately before the cash column. At the account-rendering period a line is ruled, the total added up and placed slightly to the left, and a "1," "2," "3," etc., shows the number of times the account has been rendered without result.

No elaborate files are needed. A simple wooden box without a stop stands on the desk, the private cards come first with index cards (divided into men, women and children if the practice be large), then the "Live," and "Suspense" series of ledger cards, and finally the panel cards. When an account is paid, it is removed into the "Suspense" ledger group; when it is written off as bad it is placed at the rear of "Suspense" and a mark, a dash at the top, placed on the visiting card. If another call is asked for, it is known if the patient is a non-payer and one can decline to go. If the account is later paid, a ring round the dash warns the practitioner not to let the account run too long in future.

RENDERING ACCOUNTS

At the account-rendering period the practitioner simply takes out the "Live" ledger group, stands them against the inkpot and quickly writes out the accounts, as there is no ledger to hunt through, no "dead" cards to bother with, everything is available. I use transparent fronted envelopes which saves writing the address twice. A three-halfpenny stamp receives more attention than a halfpenny one but, if the number of accounts be large, the extra collection hardly pays for the extra cost of postage.

How often should accounts be rendered? Of old, never more often than quarterly, not infrequently half-yearly and yearly. In all save a few old business houses the monthly account is now normal. People are used to monthly accounts, and if an account is rendered at the end of the month following the recovery (or death) of the patient, no offence can be taken. The practitioner would do well to remember that when sent

for he is God, when he attends he is an Angel, when the case is over a Man, and when his bill comes a Devil. If the account is rendered with reasonable promptness, the attention of the doctor is gratefully remembered, the number of times he has attended is recalled, and the account is passed, even if not paid, as reasonable. Three, six or twelve months afterwards, the illness is forgotten, the number of visits seems excessive, and the account is regarded as grossly unreasonable, and is much less likely to be paid. Again, the more frequently an account is rendered, the smaller will each individual account be, and an account of three pounds say five times in a year is more likely to be settled each time, than one of fifteen pounds, a sum which might not be easily obtainable.

OUTSTANDING ACCOUNTS

What is to be done about accounts that are outstanding too long? My method in an industrial practice was as follows. The account was sent in, normally, twice. The third time a brief rubber-stamped note was appended saying the books were being balanced and that prompt settlement would be appreciated. The fourth time the patient was asked to pay promptly, by instalments if more convenient, and to call to discuss any point that was doubtful. The account was left in the group two more months, and at the end of the sixth month was written off. The artisan class who have not paid in six months will not pay at all. Their accounts are not large enough to be sent to a debt-collecting agency, and employing a man (as some practitioners do) to go round collecting a little each week has in my experience brought in very little money, caused much ill-feeling, and is a definite mistake. The Law is useless in such cases.

In a better-class practice, where accounts are much larger, difficult accounts may be handed over to a collecting agency, but I prefer writing a quiet, sincere letter, saying payment would be a great convenience, and asking the patient to come and discuss the whole matter, especially if the account seems in any way incorrect. If this produces no effect, write the debt off. The medical man's business is not that of a debt-

collector. Every ethical method should be used to prevent accounts mounting to such an amount that their loss would be a serious matter. Be firm and polite, endeavour to get your money, but, if you fail to get it, let it go.

As a lawyer I am of opinion that, save in exceptional cases, for example when the competence of the doctor is questioned, the law is not only almost useless but even harmful to a practice. It is easy to go to the County Court, get a Plaint Note and write down the debts; summonses are issued, orders are made for payment, often at so much a week, and payment is not made. What is the practitioner to do? Put the bailiffs in? Try to get a committal order? These methods are bad, for they are usually ineffective, and lower his standing in the district. Be business-like, be conscientious and write off your losses, with as cheery a smile as possible, and write them off quickly!

SPECIAL POINTS

In midwifery cases, the fee should be fixed in accordance with the local scale, making it clear such fee is due when visits cease and is due even if the case be "B.B.A." In poor practices it is wise to suggest part-payment in advance at ante-natal visits.

In all practices when a patient has to be sent into a hospital, and more especially into a nursing home, an honest effort should be made to estimate the *total cost* to the patient: the practitioner's own fees, the specialist's and anæsthetist's fees, the nursing home charges, and so on should be estimated as closely as possible, and the patient or friends given a rough figure "if there are no complications": even a successful nursing-home case that results in a bill twice, thrice or even more the sum the patient expected will do a lot of harm.

It is a sound rule to inform the patient *beforehand* the exact sum it is proposed to charge for any treatment extra to ordinary treatment, e.g. circumcision. This avoids the possibility not of dispute, for it is too rarely that patients honestly dispute and discuss matters that annoy them, but of irritation that may well cause the patient to "try someone else" next time.

PRACTICAL NOTES

GLUCOSE IN TREATMENT

THE wide occurrence of dextrose (glucose) in foods, the vast literature of biochemical and physiological investigations of this substance, and the claims made in advertising have led the Council on Foods of the American Medical Association to publish a brief report on the significance of dextrose in the diet of the normal adult (*Journal of the American Medical Association*, February 13, 1937, cviii, 556). Dextrose occurs naturally in many ordinary foods, in honey, in grape juice and other fruit juices, and in maple syrup. Dextrose is obtained as one of the products of digestion of cane sugar and milk sugar, and it is the end product of the digestion of the starches and maltose. Within the body dextrose can be formed from glycogen, amino-acids, the glycerol of fats, and probably from lævulose and galactose. Dextrose is now found in many fabricated food mixtures. It is also being produced in pure form in large quantities. Its sweetness is about 75 per cent. that of sucrose. Dextrose should not be given the status of a preferred food as this is not compatible with known facts. Although dextrose requires no hydrolytic changes in the alimentary tract to prepare it for absorption, it is incorrect to state that it is instantly absorbed. Dextrose is well utilized as a food, but it possesses no practical advantages over many other carbohydrates in combating ketosis produced by either a high-fat diet or by fasting, nor does dextrose itself have unique advantages when administered by mouth to prevent or relieve fatigue or to maintain muscular efficiency to a high degree. Dextrose is produced by the digestion of the most important dietary carbohydrate, starch. The evidence which indicates any superiority, under normal conditions, of dextrose ingested as the free sugar over dextrose ingested as the polysaccharide starch is not convincing.

PROPHYLAXIS OF ASPHYXIA NEONATORUM

ACCORDING to E. Poech (*Münchener medizinische Wochenschrift*, February 26, 1937, 331) the treatment of respiratory difficulty in the newborn baby ought to be carried out much earlier than it usually is. In other words, he recommends in cases of foetal distress that attempts to stimulate the baby ought to be made actually before delivery is complete. Employing cardiazol he suggests that this can be injected intramuscularly or intravenously into the mother and that this will secure for a short period of time a definite stimulant effect upon the foetal circulatory system. The same drug may be injected into the presenting part, although certain precautions must be taken and in particular if there is a breech, it is probably better to use the indirect route through the mother. It is maintained, with justice, that many cases of apparent respiratory failure in the newborn baby are, in

fact, primarily circulatory failure, seen at its worst in the so-called white asphyxia. Hence, the early use of circulatory stimulants appears to be justified and it is maintained that there is no risk of premature stimulation of the respiratory centre when cardiazol is used in this manner.

THE TREATMENT OF PSORIASIS BY COLLOIDAL MANGANESE

SINCE 1922 claims have been advanced for the efficacy of colloidal manganese in the treatment of psoriasis. Henry D. Niles of The New York Post Graduate Medical School and Hospital began an investigation in 1933 and has now published his results in 72 cases together with a review of the literature (*New York State Journal of Medicine*, February 1, 1937, xxxvii, 298). He concludes: "While the results are, occasionally, temporarily good, this treatment is too long, uncertain, and potentially dangerous to be considered as a valuable aid in the treatment of psoriasis. Only two or three patients were completely cured and so relatively few were definitely benefited that these results may have been due to the softening effect of the boric acid salve or to a spontaneous remission, as occasionally occurs in this disease. The injections did not appear to prevent recurrences nor delay their appearance; in fact in some patients new lesions appeared even during the treatment. Local therapy was not more effective or rapid during or after the injections than before."

THE TREATMENT OF SCIATICA

FROM his experiences with the treatment of over 1,000 cases of sciatica during the past fifteen years, J. Paraf (*Progrès médical*, March 13, 1937, 413) lays down certain rules for the management of this troublesome condition. In the first place exact diagnosis is most important and secondly, 20 per cent. or possibly more of patients with sciatica will get well in about a week with simple measures such as rest and sedatives. Rest in bed with warm applications over the painful region together with the administration of sedatives such as aspirin, pyramidon or antipyrin alone or associated in dosage of 15 to 45 grains daily, should be prescribed in the first instance for all early cases. If there is not prompt improvement, then local injections should be employed and two methods are suggested. One is to utilize a 25 per cent. solution of antipyrin in alcohol and two to three c.cm. of this solution are injected at two or three points along the painful portion of the sciatic nerve. The greatest care must be taken to prevent the alcohol reaching the nerve and in order to achieve this, a needle through which 1 c.cm. of one per cent. novocain has been injected into the nerve is then withdrawn at least 4 cm. The second method consists of injecting lipiodol 3 to 4 c.cm. and the exact situation for the injection will vary with the type of case.

THE TREATMENT OF POST-OPERATIVE HICCOUGH

PARTICULARLY likely to follow gastric surgery, hiccough may be a most distressing post-operative disturbance. H. Durst (*Münchener medizinische Wochenschrift*, January 15, 1937, lxxxiv, 106) maintains that it is caused in most instances by a flow of bile back into the stomach. He recommends therefore that a thin duodenal tube be passed into the stomach and the contents of this organ aspirated by means of a syringe attached to the tube. If bile is obtained then the tube should be allowed to pass further into the duodenum and left in place for drainage of bile to continue. If regurgitation of bile can be definitely excluded in this way, then the treatment of hiccough by inhalation of carbon dioxide is recommended as of great value. This shrewd author remarks that bringing the apparatus to the bedside and leaving it there for a time often has a beneficial effect. For operations when the symptom persists despite these measures, he suggests blocking of the phrenic nerve on both sides by injecting 10 to 20 c.cm. of a half per cent. novocain solution.

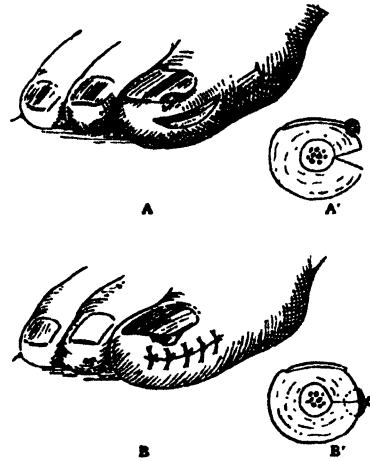
SALINE FOR MYOCARDIAL INFARCTION

CERTAIN American authors have reported excellent results in certain forms of chronic arterial disease by the intravenous injection of hypertonic saline. A. Tamchès (*Presse médicale*, February 17, 1937, xlv, 263) records similar experiences in the application of this method to the particular example of severe coronary affection with infarction of the heart muscle. In the first patient so treated, vomiting was a marked feature, resembling, to some extent, the vomiting of uræmia and it was this which led the author first to inject a sodium chloride solution intravenously. In the second instance circumstances prevented the intravenous use of saline but hypertonic solutions given per rectum seemed to have produced definitely beneficial effects. The author emphasizes that in his two patients, not only had the usual measures not produced any relief, but in his opinion the use of saline definitely limited the area of affection of the heart muscle. It appears that following the American authors he would suggest a 5 per cent. solution for intravenous use.

CONSERVATIVE OPERATION FOR THE CURE OF SO-CALLED INGROWN TOENAIL

RECENT reports in the American literature of a large series of cases of ingrown toenail make it apparent that the methods of treatment in common usage yield too long a period of incapacity and too high a rate of recurrence. Robert W. Bartlett (*Journal of The American Medical Association*, April 10, 1937, cviii, 1257) suggests that the terms "ingrowing toenail" and "ingrown toenail" are misnomers. The cause in the vast majority of cases appears to be compression of the

nail edge against the nail wall by too narrow shoes. The sharp edges cause a break in the soft wall and this break becomes infected. He does not believe that the nail actually changes its direction of growth to bore into the soft tissues. The operation he commends has a basic principle different from existing operations. The principle is to pull away the nail wall from the nail edge by excision of a wedge of soft tissue from the side of the toe. The nail and infected region are untouched and the operation is in an uninfected field. When the patient is first seen, the soft tissues are usually acutely inflamed. He is sent home with instructions to soak the foot in hot water several times a day and to rest it as much as possible. When he returns in from four to seven days the infection will be found to have subsided markedly and he may then be operated on. Anæsthesia is achieved by blocking the digital nerves with 2 per cent. solution of procaine hydrochloride with 2 minims of adrenaline per ounce added. Ten minutes are allowed for anæsthesia to be complete, after which a sterile rubber band tourniquet is applied to the base of the toe to ensure a dry operative field. The wedge excised should extend inward to the bone, and the widest point of its base should be level with the "ingrown nail." At this point the width of the base should be about one-fourth of an inch. The patient returns home with advice to rest for one day, after which he may go about in a slipper. The stitches are removed at the end of a week. The patient must be warned not again to wear too narrow shoes.



THE PROPHYLAXIS OF CHICKEN-POX

CHICKEN-POX is such a mild disease that its prophylaxis is rarely considered to be necessary, but occasionally, as a matter of convenience, it is desirable to prevent its occurrence. Recently, J. W. Bigger, in his own family, had occasion to attempt the prophylaxis of this disease, and his report (*Irish Journal of Medical Science*, March 1937, 126) is of general interest. His son developed chicken-pox and his daughter spent considerable time with the boy on the two days preceding the appearance of the eruption, and also on the morning of the day of its appearance. She was possibly susceptible to chicken-pox as she had not had it before. It was of importance to her

not to develop the complaint as she was anxious not to miss certain lectures. Bigger determined to attempt "vaccination," a method of prophylaxis advocated by Kling in 1913, and, after preparing his son's skin with alcohol, tried with syringe and fine needle to aspirate fluid from vesicles. The amount of fluid to be obtained was surprisingly small. After puncturing five vesicles, no fluid was to be seen in the syringe. It was hoped, however, that the needle contained some, and so 0.1 c.cm. of sterile saline were drawn into the syringe, the contents of which were then injected intradermally into his daughter's forearm. No alteration occurred at the site of injection for eight days, when it was observed to be slightly red. On the next day a definite papule was present, and by the tenth day it had become vesicular resembling exactly a pock of chickenpox. No other pocks appeared and there was no constitutional disturbance. The local lesion disappeared in a few days and generalized varicella did not develop. The formation of the pock after an incubation period of eight days established the girl's susceptibility to the disease, and there was little doubt that, if she had not been "vaccinated," she would have suffered from an attack of the natural disease.

TREATMENT OF MENIÈRE'S SYNDROME

IN 1861 Prosper Menière first related the syndrome of deafness and tinnitus associated with explosive attacks of vertigo, vomiting and nystagmus, to the inner ear. Unfortunately he taught that it was due to hæmorrhage into the labyrinth. To-day it is realized that the pathological anatomy of the syndrome is unknown. The condition is very disabling and may cause complete invalidism, though not in itself fatal. Hitherto it has been generally conceded that treatment is unsatisfactory. Recent publications, however, claim better results for new medical and surgical methods. Madelaine R. Brown (*Journal of The American Medical Association*, April 3, 1937, cviii, 1158) reports relief from attacks in twelve patients treated by a low sodium diet with the addition of ammonium chloride to prevent the storage of sodium in the body; this treatment was first put forward by A. C. Furstenburg in 1934. The details of the low sodium diet are set forth in Brown's paper. The ammonium chloride is taken with each meal in the form of six $7\frac{1}{2}$ grain capsules, three days on and two days off. Donald Munro (*New England Journal of Medicine* April 1, 1937, ccxvi, 539) claims that true Menière's disease is curable in nearly 100 per cent. of cases by division of the entire eighth cranial nerve or its vestibular portion alone. He advocates that the operation be carried out through a unilateral suboccipital craniotomy. At the same time, Munro advocates that the patient should first have the benefit of a trial of the salt-free diet and that operation should be reserved as a final therapeutic effort. If the operator is familiar with his field and his technique is good, the mortality will be below 0.5 per cent.

REVIEWS OF BOOKS

Milk Products. By W. CLUNIE HARVEY, M.D., D.P.H., and HARRY HILL, M.R.SAN.I. London: H. K. Lewis & Co., Ltd., 1937. Pp. viii and 387. Illustrations 73. Price 16s.

Milk and Nutrition. Part I. The Effect of Commercial Pasteurization on the Nutritive Value of Milk. Published by the Natural Institute for Research in Dairying, Shinfield, Reading, 1937. Pp. 67. Price 2s. 6d.

THE first of these two important new books may be regarded as a sequel to *Milk Production and Control* by the same authors. It deals with various types of milk (condensed, evaporated, dried), ice-cream, cream, cheese, butter and margarine with certain subsidiary milk products. Each chapter deals with such matters as food value, chemical aspects, bacteriological control and legislative matters. This is essentially a textbook for public health workers and it is a valuable work of reference for all those concerned with an important branch of hygiene. A vast amount of information has been obtained and re-arranged in a skilful manner and this book can be confidently recommended.

The Milk Nutrition Committee arose as a result of an informal conference called towards the end of 1934 by the Milk Marketing Board's Advisory Committee on Milk Publicity. The report here reviewed contains an account of some experiments planned to investigate certain problems concerning the nutritive value of milk to be carried out at the National Institute for Research in Dairying (University of Reading) and the Rowett Research Institute, Bucksburn, Aberdeen. The special research work here described deals with the effect of commercial pasteurization on the nutritional availability of certain elements in milk (calcium, phosphorus, nitrogen, vitamins) as tested by laboratory methods. It is pointed out that the application of the results to the problems of human nutrition are the object of further investigations to be discussed in subsequent reports.

Diseases of the Eye. By EUGENE WOLFF. London: Cassell & Co., 1937. Pp. 225. Illustrations 120. Price 15s.

THE author has compressed into a relatively small manual the essential and practical features of ophthalmology. The book is well and richly illustrated with many admirable drawings, diagrams, photographs of anatomical dissections and photomicrographs of normal and pathological material. There is a great deal to be learned from these illustrations. On the whole the book is well balanced but certain diseases might have been more fully described. The account of ophthalmia neonatorum would have been of greater value to the general practitioner if more details regarding the preventive treatment and complications had been given. In the section on rodent ulcer radium is advised and there is no statement about the contra-indications for radiotherapy, for instance when bone is involved. There are not many ophthalmic surgeons in this country who would place alcohol

injections into the orbicularis muscle in the treatment of entropion before the skin muscle operation. The *Bacterium tularense* as an infective agent in lesions grouped under the term of Parinaud's conjunctivitis is not mentioned and one of the commonest types of tuberculous conjunctivitis—the cockscomb variety is also omitted from the description of this disease. The book is well printed and produced, and should prove of value to general practitioners.

Practical Orthoptics in the Treatment of Squint. By KEITH LYLE and SYLVIA JACKSON. London: H. K. Lewis & Co., 1937. Pp. 207. Illustrations 63. Price 12s. 6d.

ONE of the authors is an ophthalmic surgeon and the other an orthoptist. Their book is essentially practical, theoretical and academic matters have been excluded. They describe the management of a large orthoptic clinic, the instruments used in orthoptic training and the methods of examining and treating cases of motor anomalies of the eyes. The illustrations are clear and readily understood and there is much valuable information given in the tables of the results of treatment. There is a short chapter dealing with the principles of muscle operations; another chapter is concerned with paralytic squint and there is also an interesting account of ocular torticollis which is admirably illustrated. The print and production of the book are good. It should serve a useful purpose as a guide which contains much information of practical value both for the ophthalmic surgeon and the orthoptist.

Diets and Recipes and the Treatment of Diabetes and Obesity. By E. P. POULTON, M.A., M.D., F.R.C.P. London: Humphrey Milford, Oxford University Press, 1937. Pp. xii and 121. Figs. 5. Price 7s. 6d.

THIS is a valuable and authoritative account of the modern dietetic management of the two disorders in which this plays a prominent part, namely diabetes and obesity. Chapters also deal with the general treatment of diabetes and its complications and with the modern views on certain organic and mineral constituents of food. An appendix containing diet tables, recipes and specimen diets, in which Dr. Poulton is aided by Mrs. Hawkey, can also be obtained separately for daily use in the home. There are two useful illustrations showing the size of carbohydrate and fat rations in certain articles of food. Over two hundred recipes in a usefully condensed form will be found of value by the housewife seeking to transform this book's teaching into practical values.

Diseases of the Nose, Throat and Ear. By I. SIMSON HALL, M.B., CH.B., F.R.C.P.E., F.R.C.S.E. Edinburgh: E. & S. Livingstone. Pp. xv and 423. Figs. 55. Price 10s. 6d.

THERE is undoubtedly a need for a short practical handbook on diseases of the nose, throat and ear for the senior student who may find himself rather overwhelmed by the fuller textbooks on this rather difficult specialty, which is almost daily becoming more extensive in its field, and this need Mr. Simson Hall, who was recently appointed to one of the senior posts at

Edinburgh Royal Infirmary, has endeavoured to meet with this book of handy size, well produced and illustrated. The author wisely concentrates on the commoner complaints, and no doubt in a future edition will make some additions and corrections to some of the accounts of the less common diseases. In the short section on the use of cocaine in nasal examination it might be wise to mention the strength of the solution used; a student (or practitioner) hardly needs to know quite so much detail about the operations of nasal septum resection (and the 16 instruments used by the author); the skiagrams of the mastoid (pages 339 and 340) are confusing and would be better facing each other; the operation of decompression of the facial nerve is hardly "a comparatively simple matter" (p. 345); the paragraphs on brain abscess should either be omitted or elaborated; and it is probably safer to print 0.75 per cent. and not .75 per cent. for the percentage of iodine in boracic and iodine powder.

Handbook of Orthopedic Surgery. By ALFRED RIVES SHANDS, JR., B.A., M.D. and RICHARD BEVERLEY RANEY, B.A., M.D. London: Henry Kimpton, 1937. Pp. 593. Illustrations 169. Price 21s.

THE aim of this book is to make a clear presentation of the main facts of orthopædic surgery, for the benefit of students and general practitioners. An attempt has been made to represent the views of all acknowledged authorities on the subject both by compilation from textbooks, and also by submitting each section of the book to several surgeons for criticisms and suggestions. Such a plan has obvious advantages, but also certain drawbacks. It is certainly a sound representation of current opinion, but the student will often find that he is presented with a choice of methods without having any very definite guidance as to which he will choose. The completeness of the book consists in the fact that it deals with almost every kind and variety of diseases of the bones and joints, for example—osteopetrosis, melorheostosis, xanthomatosis, Kienhoch's disease are mentioned and shortly described, as well as many other rare conditions. The incompleteness of the book lies in the fact that few of the really important problems of orthopædic surgery, e.g. club foot, tuberculous spine, or poliomyelitis are discussed fully enough to afford a practical guide. It will be an excellent book for a student to read for his examination, but will not be enough to guide him when he is a practising orthopædic surgeon. Great care has been taken with the selection and reproduction of the illustrations, which for the most part consist in clear line drawings, of anatomical parts, surgical operations or X-ray appearances. There is a comprehensive list of books at the end of the volume which occupies 58 pages.

The History of the Acute Exanthemata. By J. D. ROLLESTON, M.D., F.R.C.P., F.S.A. London: William Heinemann (Medical Books), Ltd. Pp. 114. Illustrations 10. Price 7s. 6d.

THE four Fitzpatrick Lectures on the history of medicine at the Royal College of Physicians of London during the years 1935 and 1936 were devoted to smallpox, chicken-pox, scarlet fever, measles, and German measles. They start in the remote past and carry the story on until the

present day with copious detail and full documentation. The illustrations of those fathers of medicine responsible for the gradual differentiation of the special varieties of fever are well chosen and satisfactorily reproduced. Typhus and enteric fevers, sometimes placed in the groups of the acute exanthemata are not included in these lectures as they are thought to be more suitably ranked by themselves in the class of continued fevers.

Meditatio Medici: A Doctor's Philosophy of Life. By W. CECIL BOSANQUET, D.M., F.R.C.P. Aldershot: Gale and Polden Ltd., 1937. Pp. iv and 162. Price 7s. 6d.

THIS is a charmingly written *apologia*, in many respects recalling Sir Thomas Browne, with a mingling of humour and an underlying element of sadness. A classical fellow of New College, Oxford, and a physician to several London hospitals, the author covers a wide field of physics and physic as well as of philosophy, and discusses, as few are so well qualified to do, the relations of things of the spirit to those of material structure, the problem of a future life, and the bearing of protopathic and epicritic sensations on the sequence and course of development of the senses in past ages. It is clearly pointed out how much of the new physics was anticipated by the ancient Greek philosophers, particularly by Heracleitus the gloomy, of Ephesus, who set out his views of human affairs in the most obscure language. This is a book to keep, not to read at one sitting, but to return to often.

Who'd be a Doctor: An Autobiography. By ANTHONY WEYMOUTH. London: Rich & Cowan, Ltd., 1937. Pp. xii and 340. Price 8s. 6d.

THIS is a well-written, easily read, and from several points of view an extremely interesting account of the varied experiences of a medical man, educated at St. Thomas's Hospital, who has seen practice in the slums of Sheerness, the R.A.M.C. during the War, and in Queen Anne Street. There are many good stories and plenty of shrewd but kindly comments of humanity and personalities; some of those mentioned by name, real, and there are several such, or concealed, may be able to identify the author who has adopted a subsidiary career as described in a chapter entitled "Who'd be an Author?" He gives an account of the history of his "Frozen Death," and seems to be an optimist who has enjoyed both his careers, in spite of the somewhat negative suggestion in the title of this book and that of its chapter just mentioned.

NEW EDITIONS.

For the fourth edition of *Diseases of the Nose and Throat* (Cassell & Co., Ltd., 45s.) now twenty-five years old, SIR ST. CLAIR THOMSON, M.D., F.R.C.P., F.R.C.S., has obtained the help of Mr. V. E. NEGUS, M.S., F.R.C.S., and he has also discovered a new apt quotation from Montaigne which epitomizes the position this valuable work has obtained—"all the world recognizes me in my book and my book in me." Introduced with all modesty into the preface this phrase may well be used as the only comment necessary by the reviewer. The ten years which have elapsed since this book appeared in a previous edition have seen many changes and rigid revision has resulted in the introduction of much new material with only a slight increase in size

Buchanan's Manual of Anatomy, edited by PROFESSOR J. E. FRAZER for its sixth edition (Baillière, Tindall & Cox, 35s.) has been revised as regards nomenclature by the introduction of the new Birmingham Revision throughout. Fifteen pages of glossary, however, help the student to remain familiar with terms in common use although officially "discarded." A general revision of the text has also been undertaken and there are several new illustrations. The introductory sections on embryology remain, under Professor Frazer's guidance, a masterpiece of clear exposition.

A second edition of *Synopsis of Pediatrics* by PROFESSOR J. ZAHORSKY and DR. T. S. ZAHORSKY (Henry Kimpton, 17s. 6d.) contains many new sections and several new coloured plates. The book is designed to cover the whole course of pædiatrics suitable for medical students and it is a valuable small textbook within the limits imposed by the synoptic method.

Mothercraft, by MARY TRUBY KING, is now issued in a fifth edition (Simpkin, Marshall Ltd., 3s. 6d.) and mothers will find it a most valuable guide to the rearing of healthy children. So much of the "Truby King" teaching is essentially sound that it is a matter for regret that methods of diluting cow's milk, unsupported by the majority of responsible pædiatrics in this country, should still be advocated.

DR. G. LAUGHTON SCOTT's little book on *The Morphine Habit and its Painless Treatment* (H. K. Lewis, 5s.) reaches a second edition at a time when the method there advocated—essentially necessitating the development of a high tolerance to belladonna—has secured wide adoption in the medical world. In revising his monograph the author has made numerous valuable modifications designed to improve the practical application of the method.

The Medical Annual, 1937, in its fifty-fifth year (John Wright & Sons, Ltd., 20s.) appears with regularity as a part of the programme of Spring and like other harbingers of improved conditions it brings a breath of fresh interest and enthusiasm to a wide circle of readers. The editors, Dr. H. Letheby Tidy and Mr. A. Rendle Short, and their team of thirty-four contributors must again be congratulated on collecting and pre-digesting for the benefit of others a vast amount of valuable material. In addition to the medical monographs thus prepared this volume contains a great deal of practical information of a miscellaneous character on spas, mental homes, books of the year, medical and scientific periodicals and other important topics.

British Health Resorts, 1937, the official handbook of the British Health Resorts Association, edited by R. FORTESCUE FOX, M.D., F.R.C.P. appears for the fifth year in its enlarged form (J. & A. Churchill, Ltd., 2s. 6d.). As well as the latest information on spas and seaside resorts and notes on such subjects as "The Invalid's Winter" or "The Sea Coast," this handbook contains on this occasion a very interesting contribution by Mr. L. C. W. Bonacina, F.R.M.E.T.S. on "Climate, Health and the British Resorts." The section on health resorts in the Dominions and Colonies is increased this year by an account of the island of Cyprus.

NOTES AND PREPARATIONS

BRITISH HEALTH RESORTS ASSOCIATION CONFERENCE AT SKEGNESS.

THE discussion on "Industry and the Health Resort" was opened by Mr. A. L. Peterson who pointed out that one of the first concerns of Industry should be the health of the worker. The extension of holiday periods and the payment of wages during holidays would extend the beneficial use of health resorts by workers. Mr. Ernest Bevin, General Secretary of the Transport and General Workers Union, stated that the different treatment in regard to holidays with pay accorded to those who may be classed as staff, public servants and others employed in more favourable occupations, as against the actual producers upon whom the wealth of the Nation really depends, has always been a serious grievance. The need for annual holidays is becoming even more imperative, with the intensification of production methods, speeding up of processes and the increasing wear and tear of modern life. Holidays repay the employer in that their cost is set-off by the decrease in sick leave and absenteeism. Dr. Lockhart, Medical Officer of Boots Pure Drug Co., Ltd., said that if in his own company there were no paid holidays there would certainly be an increased economic loss from ill-health and lowered vitality. The discussion on "Games, Sport, and Sea-bathing" was opened by Sir Kaye Le Fleming who said that sports such as tennis, swimming, and skating, which produced the balanced mind in the balanced body, should be available for the mass of the workers, so that they would have a chance to develop a sense of pleasure in the fitness of their bodies. With regard to Skegness, he held the centre up to praise for the efforts that had been made to supply the necessary amenities. Dr. Cove Smith said that the new Government movement in favour of physical education had come none too soon. The kind of individual we want to produce is the man and woman who is fit and who *feels* fit. Dame Louise McIlroy was convinced of the value of seaside treatment for many gynaecological cases. Girls who had been accustomed to active exercise at school often fell into poor health when deprived of it, and a visit to the seaside with exercise and bathing would put them right.

NEW PREPARATIONS

ENERGEN HIGH PROTEIN CHOCOLATE.—The Energen Foods Company have introduced a new product in the form of chocolate. This is made in tablets of 3.5 gramme and is sugar-free with three times more protein than in ordinary chocolate. The sample supplied was tasty and palatable and diabetic subjects should find this a useful substitute for the usual sweetmeat.

NAVIGAN.—This is a new remedy for sea-sickness and allied disorders prepared in easily swallowed tablets and containing in each tablet 10 mgm. of "syntropan" (antispasmodic) and 50 mgm. of a mild sedative hypotic. It is suggested that 3 to 6 tablets be swallowed at least half-an-hour before sickness is likely to occur. The tablets are issued by Roche Products, Limited, 51, Bowes Road, London, N.13 in bottles of 25 and 100 and the preparation is also available in suppositories.

GENERAL INDEX

TO VOLUME CXXXVIII.

INDEX TO NAMES OF AUTHORS

	PAGE
ABRAHAM, A. : Knee jerk in health and disease - - - - -	313
— : Odour and colour of urine in health and disease - - - - -	177
BALME, H. : Use and abuse of external applications - - - - -	369
BONNEY, V. : Diagnosis and treatment of fibroids - - - - -	1
BOURNE, G. : Treatment of a case of syphilitic heart disease - - - - -	585
BRAIN, R. T. : Disorders of the skin in the pre-school child - - - - -	716
BRIGGS, I. G. : General practice. XII.—Fees - - - - -	774
BROWNE, F. J. : Diagnosis and treatment of early malignant disease of uterus - - - - -	11
BROWNE, O. : Disorders of menstruation - - - - -	44
BURRELL, L. S. T. : Indications and technique of pleural aspiration - - - - -	169
CATLIN, C., COOMBS, H., and READER, D. : Methods of treatment of obesity - - - - -	95
CHISHOLM, C. : Diet of the pre-school child - - - - -	727
CLAUBERG, C. : Clinical indications for the use of specific hormone of the corpus luteum - - - - -	634
CLAYE, A. M. : Use and abuse of drugs in midwifery - - - - -	484
COLE L. : Use and abuse of endocrine preparations - - - - -	493
COOMBS, H., READER, D., and CATLIN, C. : Methods of treatment of obesity - - - - -	95
COPEMAN, W. S. C. : Chronic and irregular gout - - - - -	749
COTTON, T. F. : Treatment of a case of thyrotoxic heart disease - - - - -	571
DART, R. A. : Nasal route of medication - - - - -	87
DAVENPORT, R. C. : Use and abuse of drugs in diseases of the eye - - - - -	571
DAVIES, D. T. : Nervous dyspepsia - - - - -	151
DODD, H. : Treatment of gonorrhoea and its complications - - - - -	624
DOUTHWAITE, A. H. : General practice. VII.—First six months - - - - -	103
EIDINOW, A. : Radio-active vaseline, a new technique for surface radium therapy - - - - -	769
ELLIS, R. W. B. : Digestive disorders of childhood - - - - -	159
ELLMAN, P. : Use and abuse of drugs in tuberculosis - - - - -	416
— : Use of insulin in non-diabetic malnutrition with special reference to pulmonary tuberculosis - - - - -	613
EX-INSPECTOR OF TAXES : General practice. VIII.—Financial side of practice - - - - -	206
FEILING, A. : Nervous and mental post-operative complications - - - - -	259
FINDLAY, L. : Tuberculosis in the child of pre-school age - - - - -	676
FLEMING, A. M. : Leucorrhoea and vaginal discharge - - - - -	33
FORBES, R. : General practice. IX.—Litigation - - - - -	317
GAUVAIN, SIR HENRY : Plaster of Paris technique in the treatment of surgical tuberculosis and other conditions - - - - -	736
GREEN-ARMYTAG, V. B. : Menopause - - - - -	57
HARDY, T. L. : Use and abuse of drugs in gastro-intestinal disorders - - - - -	434
HARRIS, C. : Treatment of a case of congenital heart disease - - - - -	577
HARRIS, W. : Relief of pain - - - - -	63
HAY, J. : Treatment of a case of angina pectoris - - - - -	562
HILL, J. : Treatment of sea-sickness - - - - -	297
HIRSCHMANN, J. : Note on treatment of sterility - - - - -	111
HOLMES, A. H. : Erythema nodosum - - - - -	181

	PAGE
HOWELL, B. WHITCHURCH : Diagnosis and treatment of congenital deformities in young children - - - - -	703
HOYLE, C. : Use and abuse of alcohol - - - - -	355
HUDSON, B. : Influences of altitude on asthma - - - - -	202
HUGHES, E. C. : Carcinoma of stomach and intestines - - - - -	129
HUNT, T. : Chronic peptic ulcer - - - - -	139
HURST, A. F. : Constipation and its treatment - - - - -	121
JACKSON, H. : Head injuries - - - - -	188
KERSLEY, G. D. : Use and abuse of drugs in rheumatic diseases - - - - -	458
LEARMONTH, J. R. : Post-operative care, surgical aspects - - - - -	236
LIBRARIAN OF THE BRITISH MEDICAL ASSOCIATION : The doctor's library - - - - -	648
LIGHTWOOD, R. : Treatment of epilepsy in children - - - - -	307
LOVE, R. J. McNEILL : Bed-sores and their treatment - - - - -	277
McNEIL, C. : Acute respiratory disorders in the pre-school child - - - - -	668
MAGILL, I. W. : Post-operative care, anæsthetic aspects - - - - -	247
MASSINGHAM, R. : Use and abuse of drugs in acute specific fevers - - - - -	405
MAXWELL, J. : Use and abuse of drugs in lung diseases - - - - -	404
MENNELL, J. : Physiotherapy in post-operative convalescence - - - - -	269
MICKS, R. H. : General practice. X.—Prescribing and dispensing - - - - -	529
MITCHELL, G. : Two cases of acute hæmorrhagic pancreatitis with recovery following operation - - - - -	109
NEWMAN, C. : Use and abuse of drugs in disorders of the liver - - - - -	451
O'DONOVAN, W. J. : Use and abuse of drugs in skin diseases - - - - -	475
OGLIVIE, W. H. : Abdominal pain - - - - -	73
ORMEROD, F. C. : Use and abuse of drugs in diseases of the ear, nose and throat - - - - -	520
PARSONS-SMITH, B. : Treatment of a case of rheumatic heart disease - - - - -	594
PETERS, R. A. : Use and abuse of vitamins - - - - -	340
PILKINGTON, F., and SARGENT, W. : Use and abuse of drugs in psychological medicine - - - - -	502
PLATT, R. : Use and abuse of drugs in kidney disease - - - - -	428
READER, D., COOMBS, H., and CATLIN, C. : Methods of treatment of obesity - - - - -	95
RITCHIE, W. T. : Treatment of a case of hypertensive heart disease - - - - -	553
ROLLESTON, SIR H. : General practice. XI.—On writing medical papers - - - - -	642
— : Use and abuse of drugs and preparations. Introduction - - - - -	337
RUSSELL, W. R. : Use and abuse of sedatives - - - - -	347
SARGENT, W., and PILKINGTON, F. : Use and abuse of drugs in psychological medicine - - - - -	502
SCHOTT, A. : Value of the electrocardiogram in general practice - - - - -	603
SHAW, W. : Some gynæcological sequelæ of natural delivery - - - - -	24
THOMSON, A. P. : Post-operative care : medical aspects - - - - -	225
UNGLEY, C. C. : Use and abuse of drugs in disorders of the blood - - - - -	388
WHEELER, SIR W. I. de C. : Catheters, and the avoidance of sepsis - - - - -	284
WHITBY, L. E. H. : Use and abuse of serums and vaccines - - - - -	362
WILKINSON, K. D. : Use and abuse of drugs in cardiovascular conditions - - - - -	377
WOOD, RT. HON. SIR KINGSLEY : Care of the pre-school child. Foreword - - - - -	665
WORSTER-DROUGHT, C. : Care and treatment of inflammations of the nervous system in the pre-school child - - - - -	687

INDEX TO NAMES OF SUBJECTS

Abbreviation : *abs.* = Abstract

	PAGE
Abdomen, "burst" - - - - -	242
—, distension of, post-operative - - - - -	232
Abdominal diseases, use of sedatives in - - - - -	354
Abortion, habitual, early, corpus luteum hormone in - - - - -	638
—, late, corpus luteum hormone in - - - - -	641
—, repeated, treatment of - - - - -	55
—, threatened, corpus luteum hormone in - - - - -	639
Abscess, appendicular, chronic, diagnosis from carcinoma - - - - -	136
—, Brodie's, in pre-school child - - - - -	712
—, lung, use of drugs in - - - - -	410
—, prostatic, post-gonorrhoeal - - - - -	629
—, subphrenic, fever in - - - - -	230
Accounts, rendering of - - - - -	779
Acidosis, post-anæsthetic - - - - -	254
Actinomycosis, post-operative - - - - -	231
Adenitis, cervical, in pre-school child - - - - -	680
Adrenaline, action of - - - - -	499
Agranulocytosis, treatment of - - - - -	403
Airway, obstruction of, post-operative - - - - -	249
Albuminuria in exanthemata, treatment of - - - - -	472
Alcohol, action of, general - - - - -	357
—, local - - - - -	355
—, on nervous system - - - - -	359
—, antiseptic action of - - - - -	356
—, gastric effects of - - - - -	358
—, use of as food - - - - -	358
—, in exanthemata - - - - -	474
—, in gastro-intestinal disorders - - - - -	439
—, therapeutic effects of - - - - -	360
—, use and abuse of - - - - -	355
Alkaline salts, use of in gastro-intestinal disorders - - - - -	434
Altitude, influence of, on asthma - - - - -	202
Amenorrhœa, acquired - - - - -	45
—, congenital - - - - -	45
—, endocrine - - - - -	46
—, hormone therapy of - - - - -	54
—, physiological - - - - -	44
Anæmia, congenital, treatment of - - - - -	402
—, Cooley's erythroblastic, treatment of - - - - -	402
—, due to blood destruction, treatment of - - - - -	389
—, due to hæmorrhage, treatment of - - - - -	389
—, due to mechanical interference with blood-forming organs, treatment of - - - - -	402
—, due to physical injury, treatment of - - - - -	401
—, due to specific nutritional deficiency - - - - -	390
—, due to thyroid deficiency, treatment of - - - - -	401
—, due to toxic inhibition, treatment of - - - - -	401
—, due to vitamin C deficiency, treatment of - - - - -	401
—, hypochromic, treatment of - - - - -	398
—, macrocytic, treatment of - - - - -	391, 398, 402
—, nutritional, causes of - - - - -	390
—, pernicious, Addisonian, treatment of - - - - -	398
—, —, of pregnancy, treatment of - - - - -	398
—, —, subacute combined degeneration in, treatment of - - - - -	396
—, —, treatment of - - - - -	391
—, post-operative - - - - -	235
—, splenic, treatment of - - - - -	402
—, treatment of - - - - -	388
Anæsthesia, basal, for children - - - - -	<i>abs</i> 114
—, local, for catheterization - - - - -	287
—, —, for ear - - - - -	523
—, —, for eye - - - - -	519
—, —, for nose - - - - -	526
—, —, for pharynx and larynx - - - - -	528

	PAGE
Anæsthetics, spinal, complications of - - - - -	258, 261
—, basal, precautions in use of - - - - -	249
—, nervous complications due to - - - - -	261
—, post-operative care in relation to - - - - -	247
—, post-operative complications of - - - - -	247
Anal canal, carcinoma of - - - - -	135
Analgesia, obstetrical - - - - -	abs 544
Analgesic paints, use of - - - - -	375
Analgesics, use of in rheumatic diseases - - - - -	459
Angina pectoris, treatment of - - - - -	abs 69, 214, 562
—, —, —, —, general - - - - -	564
—, —, —, —, surgical - - - - -	568
Anorexia in children - - - - -	159
—, —, —, —, treatment of - - - - -	161
Anorexia, significance of - - - - -	142
Antacids, use of in gastro-intestinal disorders - - - - -	434
Antigens, uses and abuses of - - - - -	365
Antiphlogistine, use of - - - - -	373
Antispasmodic remedy, new - - - - -	abs 546
Antispasmodics, use of in gastro-intestinal disorders - - - - -	441
Aortic regurgitation, syphilitic - - - - -	587
Aortitis, syphilitic - - - - -	586
Aperients, use of, in gastro-intestinal disorders - - - - -	445
Appendicitis, acute, in children, colic in - - - - -	165
—, —, —, —, —, vomiting in - - - - -	162
—, —, —, —, —, urticaria and - - - - -	abs 218
Applications, external, use and abuse of - - - - -	369
Arrhythmia, electrocardiogram in - - - - -	608
Arthritis, chronic, treatment of, new drug for - - - - -	abs 216
—, —, —, —, —, menopausal - - - - -	58
Aschheim-Zondek test in fibroids - - - - -	3
Asphyxia neonatorum, prophylaxis of - - - - -	abs 682
Aspirators, types of - - - - -	173
Asthma, bronchial, value of alpine climate in - - - - -	205
—, —, —, —, —, influence of altitude on - - - - -	202
—, —, —, —, —, psychological effect of alpine climate in - - - - -	205
—, —, —, —, —, spasmodic, use of drugs in - - - - -	412
—, —, —, —, —, treatment of, by inhalations - - - - -	406
Astringents, use of, in gastro-intestinal disorders - - - - -	445
Atophan, use of, in rheumatic diseases - - - - -	459
Auricular fibrillation, electrocardiogram in - - - - -	610
—, —, —, —, —, post-operative - - - - -	235
Aurotherapy of rheumatic diseases - - - - -	460
Automatism - - - - -	193
Bacillus coli infection causing persistent fever - - - - -	230
Back strain, prevention of - - - - -	273
Backache, post-operative - - - - -	257
—, —, —, —, —, puerperal - - - - -	32
Balanitis, gonorrhœal - - - - -	628
Barbiturates, prescribing of - - - - -	532
—, —, —, —, —, use of - - - - -	351
Baths in etiology of erythemas - - - - -	480
—, —, —, —, —, in obesity - - - - -	101
Bed-sores, causes of - - - - -	277
—, —, —, —, —, forms of - - - - -	277
—, —, —, —, —, treatment of, stages of - - - - -	281
—, —, —, —, —, use of alcohol in - - - - -	356
Bee venom treatment of rheumatism - - - - -	461
Belladonna, external application of - - - - -	370
Benzedrine, use of - - - - -	abs 114
Bile in urine - - - - -	179
Biliary tract, infection of, use of drugs in - - - - -	455
Birth marks, treatment of - - - - -	abs 215, 716
Bismuth salts, use of in stomach acidity - - - - -	437

Bladder, decompression of, slow - - - - -	296
—, drainage of by indwelling catheter, importance of aseptic technique in - - - - -	295
—, irrigation of - - - - -	294
—, treatment of in gonorrhoea - - - - -	624
Blood, disorders of, use and abuse of drugs in - - - - -	388
— forming organs, idiopathic disturbances of - - - - -	402
— pressure, high, prophylaxis of - - - - -	553
Book-keeping - - - - -	778
Books, selected list of, for doctors - - - - -	648
Bradycardia, electro-cardiogram in - - - - -	606
Brain, abscess of, traumatic - - - - -	190
— and spinal cord, inflammation of, in pre-school child - - - - -	693
—, contusion of - - - - -	193
—, hæmorrhage in - - - - -	193
—, injuries of, treatment of - - - - -	198
—, irritation of - - - - -	193
—, laceration of - - - - -	193
Breathing exercises, in convalescence - - - - -	272
Brodie's abscess in pre-school child - - - - -	712
Bromides, use of - - - - -	350
Bronchiectasis, treatment of - - - - -	411
Bronchitis in pre-school child - - - - -	668
—, —, —, —, treatment of - - - - -	673
—, inhalations in - - - - -	406
—, post-operative - - - - -	231
Broncho-pneumonia in pre-school child - - - - -	670
—, —, —, —, treatment of - - - - -	673
—, post-operative - - - - -	231
Burst abdomen - - - - -	242
Cæcum, carcinoma of differential diagnosis of - - - - -	135
Calamine lotion, prescription of - - - - -	475
Calcium and magnesium, phosphates of, use of in gastric acidity - - - - -	437
— carbonate use of stomach acidity - - - - -	436
—, treatment of rheumatic diseases - - - - -	461
— — — of tuberculosis, dosage of - - - - -	420
—, use of in liver disorder - - - - -	453
Carbuncle, treatment of, by X-ray - - - - -	abs 113
Cardiac decompensation, drug treatment of - - - - -	abs 543
—, failure, chronic, post-operative - - - - -	235
Cardiovascular conditions, use and abuse of drugs in - - - - -	377
Carditis, rheumatic, treatment of - - - - -	594
Carminatives, use of, in gastric disorders - - - - -	440
Catheterization, avoidance of sepsis in - - - - -	284
—, dangers of - - - - -	295
—, preparation of patient for - - - - -	286
Catheters, avoidance of sepsis during use of - - - - -	284
—, coudée, passage of - - - - -	291
—, gum-elastic, passage of - - - - -	291
—, indwelling, methods of securing - - - - -	292
—, metal, passage of - - - - -	289
—, rubber, passage of - - - - -	291
—, sterilization of - - - - -	285
Causalgia, treatment of - - - - -	67
Cerebrospinal fever in pre-school child - - - - -	688
Cervix, cancer of - - - - -	11
—, glandular erosion of, following childbirth - - - - -	28
—, prolapse of, puerperal - - - - -	30
—, secretion of, normal - - - - -	36
Chaulmoogra oil, use of in tuberculosis - - - - -	425
Chicken-pox, prophylaxis of - - - - -	abs 685
Child, pre-school, care of - - - - -	665
— See also Pre-school child - - - - -	185
Childbirth, gynecological sequelæ of - - - - -	24
Children, anorexia in - - - - -	159
—, colic in - - - - -	165

	PAGE
Children, constipation in	163
—, digestive disorders of	159
—, vomiting in	161
Chloroform, use of in midwifery	489
Chocolate cysts, diagnosis from fibroids	4
Cholagogues use, of in liver disorders	455
Chordotomy for intractable pain	64
Chorea in pre-school child	699
—, rheumatic, in pre-school child	699
Circulatory depression, post-anæsthetic—	251
— failure, acute, post-operative	234
Circumcision, technique of	628
Cleansing agents causing dermatitis	480
Climate, alpine, benefits of, in asthma	203
Club foot, treatment of	705
Cod-liver oil in tuberculosis	421
Cold applications, use of	372
Colic in children—	165
—, treatment of	167
—, renal and biliary, use of sedatives in	354
Colitis, acute, use of sedatives in	354
Collapse, post-anæsthetic	252
Colon, carcinoma of	132
—, —, —, diagnosis of	137
—, —, —, differential diagnosis of	136
—, —, —, sites of	134
—, —, —, symptoms of	133
—, —, —, treatment of	138
—, physiology of, and defecation	122
<i>Commotio cerebri</i>	194
Concussion	193
Condylomas, complicating gonorrhœa	629
Congestion, deep, relief of	372
—, local, acute, relief of	371
Conjunctivitis, gonococcal	632
—, post-anæsthetic	257
Constipation, causes of	123
—, diagnosis and symptoms of	124, 125
— in children	163
—, treatment of	121, 125
Convalescence, post-operative, physiotherapy in	269
Convulsions, infantile, etiology of	307
Corpus luteum, hormone of, clinical indications for use of	634
Cosmetics, effect of on skin	481
Cough, prescriptions for	406
—, use of drugs in	405
—, use of sedatives in	353
Creosote treatment of tuberculosis	423
Cyanosis, treatment of	233
Dactylitis in pre-school child	712
Defecation, physiology of colon and	122
Deformities, congenital, in young children, diagnosis and treatment of	703
—, rachitic, treatment of	715
Delirium, traumatic	195
— tremens, sodium evipan in	abs 545
Delivery, natural, some gynæcological sequelæ of	24
Depilatory paste, precaution in use of	482
Dermatitis, industrial, causes of	480
— medicamentosa	477
— of external ear, treatment of	522
Dextrocardia	579
Diabetic patients, post-operative care of	226
Diarrhœa, treatment of, apple powder	abs 658
Diathesis, definition of	749

	PAGE
Diet for child one to two years - - - - -	732
— two to five years - - - - -	733
— pre-school child - - - - -	727
Diet in angina pectoris - - - - -	565
Diet in chronic peptic ulcer - - - - -	146
— in constipation - - - - -	126
— in gout - - - - -	763
— in obesity - - - - -	95
Digitalis, prescribing of - - - - -	535
—, use of - - - - -	381
Digits, webbed, treatment of - - - - -	708
Diplegia in pre-school child - - - - -	708
Dispensing - - - - -	529, 540
Diuretics, clinical use of - - - - -	abs 325
—, use of, in heart failure - - - - -	386
Dogliotti's method of intrathecal alcohol injections - - - - -	69
Drains, surgical, removal of - - - - -	245
Dressings, method of fixing for easy changing - - - - -	239
—, post-operative - - - - -	239
Drug eruptions - - - - -	478
Drugs in obesity - - - - -	100
Ductus arteriosus, patent - - - - -	578
Duodenal feeding in stomach ulcer - - - - -	149
Duodenum, ulcer of, chronic - - - - -	139
—, —, treatment of - - - - -	144
Dupuytren's contractures, orthopædic treatment of - - - - -	abs 329
Dyschezia - - - - -	123
Dysmenorrhœa, endocrine - - - - -	52
—, etiology of - - - - -	50
Dyspepsia, functional - - - - -	151
—, nervous - - - - -	151
—, —, hypertonic and hypotonic patients - - - - -	153
—, —, symptoms of - - - - -	154
—, —, treatment of - - - - -	156
Ear, discharge from, chronic, treatment of - - - - -	523
—, diseases of, use and abuse of drugs in - - - - -	520, 521
Eclampsia nutans - - - - -	310
Ectropion - - - - -	15
Eczema in pre-school child, treatment of - - - - -	720
Effusions, pleural, etiology of - - - - -	169
Electrocardiogram, normal, features of - - - - -	603
—, value of in general practice - - - - -	603
Empyema, etiology and treatment of - - - - -	169
Encephalitis lethargica in pre-school child - - - - -	693
— vaccinal, in pre-school child - - - - -	695
Encephalo-myelitis in pre-school child - - - - -	695
Endocervical cancer - - - - -	12
Endocrine amenorrhœa - - - - -	46
—, dysmenorrhœa - - - - -	52
— menorrhagia - - - - -	47
— metrorrhagia - - - - -	49
— preparations, indications for - - - - -	493
—, use and abuse of - - - - -	493
— therapy of menopause - - - - -	60
— of obesity - - - - -	99
Endometrium, pathological bleeding from, corpus luteum hormone in - - - - -	635
Epidermolysis bullosa - - - - -	719
Epididymitis, gonorrhœal, treatment of - - - - -	627
Epilepsy, idiopathic, forms of - - - - -	309
— in children, differential diagnosis of - - - - -	307
—, —, education in relation to - - - - -	312
—, —, symptomatic - - - - -	307
—, —, treatment of - - - - -	307, 310
—, traumatic - - - - -	197, 200

	PAGE
Epilepsy, treatment of - - - - -	abs 112
—, use of sedatives in - - - - -	349
Epiphysis, separation of - - - - -	711
Erb's paralysis, treatment of - - - - -	709
Ergot, use of in midwifery - - - - -	484
Erythema nodosum, incidence of - - - - -	181
—, —, rheumatic theory of - - - - -	184
—, —, specific theory of - - - - -	182
—, —, treatment of - - - - -	186
—, —, tuberculous theory of - - - - -	183
Erythroedema polyneuritica in pre-school child - - - - -	701
Ether, use of in midwifery - - - - -	489
Etiquette, professional - - - - -	102
Eucortone, use of - - - - -	499
Evipan anaesthesia, polyneuritis due to - - - - -	263
Exanthemata, encephalitis following, in pre-school child - - - - -	695
Exercise in obesity - - - - -	99
Exercises, use of, in dyschezia - - - - -	128
Expenses, recording of - - - - -	208
Extrasystoles, ventricular, electrocardiogram of - - - - -	609
Eye, diseases of, drops for - - - - -	512
—, —, drugs used for general effect - - - - -	517
—, —, drugs used locally - - - - -	514
—, —, lotions for - - - - -	511
—, —, oils for - - - - -	514
—, —, ointments for - - - - -	513
—, —, powders for - - - - -	513
—, —, use and abuse of drugs in - - - - -	511
Face, injuries of, treatment of - - - - -	abs 658
Faecal impaction, diagnosis from carcinoma - - - - -	137
Fees - - - - -	774
Feet, care of, during convalescence - - - - -	275
Fever, persistency, post operative, causes of - - - - -	227
Fevers, acute specific, special symptoms of, treatment of - - - - -	473
—, —, specific treatment of - - - - -	465
—, —, —, symptomatic - - - - -	470
—, —, use and abuse of drugs in - - - - -	465
Fibroids, age incidence of - - - - -	1
—, degeneration of - - - - -	2
—, diagnosis of - - - - -	1, 3
—, —, from pregnancy - - - - -	3
—, differential diagnosis of - - - - -	3
—, treatment of, curetting - - - - -	10
—, —, hysterectomy - - - - -	9
—, —, myomectomy - - - - -	7
—, —, vaginal removal - - - - -	9
—, —, X-ray - - - - -	10
Financial side of practice - - - - -	206
Flat foot in pre-school child, treatment of - - - - -	714
Fluid, administration of in surgical shock - - - - -	237
—, —, —, post-operative - - - - -	237, 238
—, —, provision of after abdominal operations - - - - -	238
Fomentations, precaution in use of - - - - -	476
Fractional test meal in carcinoma of stomach - - - - -	131
Fractures, greenstick, treatment of - - - - -	711
— in pre-school child, treatment of - - - - -	710
Furunculosis of ear, treatment of - - - - -	522
Ganglionectomy for pain - - - - -	64
Garlic, use of in tuberculosis - - - - -	424
Gas gangrene, treatment of, by X-rays - - - - -	abs 115
Gastric secretion, stimulation of - - - - -	438
Gastro-intestinal disorders, use and abuse of drugs in - - - - -	434

	PAGE
General practice. VII.—First six months - - - - -	103
— VIII.—Financial side of practice - - - - -	206
— IX.—Litigation - - - - -	317
— X.—Prescribing and dispensing - - - - -	529
— XI.—On writing medical papers - - - - -	642
— XII.—Fees - - - - -	774
Glucose therapy - - - - -	683
—, —, in liver disorders - - - - -	451
—, use of, in exanthemata - - - - -	470
Gold treatment of rheumatic diseases - - - - -	460
— of tuberculosis, dosage of - - - - -	415
Gonorrhoea, complications of - - - - -	627
—, cure of, tests for - - - - -	626
—, treatment of - - - - -	624
Gout, acute - - - - -	753
—, chronic - - - - -	755
—, — and irregular - - - - -	749
—, diagnosis of - - - - -	760
—, irregular - - - - -	757
—, retrocedent - - - - -	757
—, treatment of - - - - -	762
Gout, treatment of - - - - -	115
Grand mal - - - - -	309
Guaiacol treatment of tuberculosis - - - - -	424
Hæmatoporphyrinuria - - - - -	180
Hæmoglobinuria - - - - -	179
Hæmophilia , treatment of - - - - -	403
Hæmoptysis , use of drugs in - - - - -	407
Hæmorrhage between periods, significance of - - - - -	12
—, gastric, unrestricted diet in, - - - - -	218
—, irregular, corpus luteum hormone in - - - - -	637
—, post-operative - - - - -	237
—, pubertal, treatment of - - - - -	53
—, uterine, continuous, following delivery - - - - -	24
Hair , defects of, congenital - - - - -	719
Head injuries - - - - -	188
—, prognosis of - - - - -	195
—, sequelæ of - - - - -	195
—, treatment of - - - - -	197
—, types of, fractures - - - - -	189
—, — of, vascular - - - - -	191
Headache in sea-sickness - - - - -	298, 299
—, post-anæsthetic, treatment of - - - - -	262
Heart disease , congenital, case needing, treatment - - - - -	581
—, —, estimating of severity of - - - - -	577
—, —, treatment of - - - - -	577
—, —, hypertensive, stages of, in relation to treatment - - - - -	554
—, —, treatment of - - - - -	553
—, —, rheumatic, period of invasion, treatment of - - - - -	594
—, —, salicylates in - - - - -	377
—, —, stage of compensation - - - - -	598
—, —, — convalescence - - - - -	596
—, —, — decompensation - - - - -	600
—, —, treatment of - - - - -	594
—, —, sedatives in - - - - -	352
—, —, syphilitic, pathology and symptomatology of - - - - -	585, 587
—, —, prognosis of - - - - -	593
—, —, treatment of - - - - -	585, 590
—, —, thyrotoxic, treatment of - - - - -	571
—, —, treatment of, general - - - - -	573
—, —, —, surgical - - - - -	575
—, —, use of digitalis in - - - - -	381
—, —, use of nitrites in - - - - -	385
—, —, use of quinidine sulphate in - - - - -	383
—, —, use of stimulants and sedatives in - - - - -	379

	PAGE
Heart, failure, congestive, treatment of	557
—, —, use of drugs in	386
—, hypertrophy of	556
Hemiplegia in pre-school child	707
—, post-operative	261
Heyman technique for treatment of cancer of cervix	17
Hiccough, post-operative	241
Hiccough, post-operative, treatment of	683
Hip joint, dislocation of, congenital	703
Hormone therapy of menstrual disorders	53
Hormones, use and abuse of	493
Hydrochloric acid use of	439
Hypertension, malignant	561
Hypnotics, choice of	abs 214
Ichthyosis, treatment of	719
Immunity, history of	362
Immunization, active	362
—, —, uses and abuses of	365
—, passive	362
—, —, uses and abuses of	364
Impetigo in pre-school child	724
Income tax questions, correspondence on	653
Indicanuria	180
Indigestion, chronic intestinal, in children	168
—, nervous	151
Infarction, myocardial, treatment of by saline	abs 684
Infection, post-operative	244
Infectious diseases, electrocardiogram in	605
Influenza, prevention and treatment of	abs 656
—, use of drugs in	410
Inhalations, use of	526
Injection treatment of neuralgia	70
Injections for relief of pain	66
Insanity, post-operative	264
Insomnia, in exanthemata, treatment of	471
—, suicide and	abs 326
—, use of alcohol in	360
Instruments and appliances eye shield for industry	217
—, —, holder for sterile stoppers	217
Insulin combined with collapse therapy in pulmonary tuberculosis	618
— treatment of diabetes	496
—, use of, in non-diabetic malnutrition	613
—, —, in pulmonary tuberculosis	425, 613, 614
—, —, —, —, dosage and technique	617
—, —, —, —, indications for	616
—, —, —, —, rheumatoid arthritis	621
—, —, —, —, thyrotoxicosis	621
Intestines, carcinoma of	129
—, large, carcinoma of	132
—, —, —, —, treatment of	138
Intrathecal alcohol injections	69
Iodine, application of	371
— treatment of tuberculosis	425
Iron in hypochromic anemias	398
Irradiation in thyrotoxic heart disease	576
Irritation, cerebral	193
Itching of jaundice, treatment of	454
Kidneys, diseases of, use and abuse of drugs in	428
Knee-jerk, absent, conditions causing	314
—, exaggerated, conditions causing	316
—, in health and disease	313
—, methods of reinforcement employed in	313
—, sustained	314
Kohler's disease in pre-school child	713

	PAGE
Labour, premature, corpus luteum hormone in	640
—, relief of pain in	<i>abs</i> 327
Lactoflavin	345
Laparotomy, care of bowels after	243
Larynx, tuberculosis of, treatment of	528
Legs, care of, during convalescence	275
Leiomyomas of uterus	1
Leucorrhœa and vaginal discharge	33
—, clinical investigation of	36
— following childbirth	27
— in relation to cancer	13
—, neoplasms associated with	42
—, treatment of	38
Leukæmia, treatment of	402
Library, the doctor's	648
Limp in pre-school child	712
Liniments, analgesic, use of	376
—, stimulating, use of	375
Liquid paraffin in constipation	126
Litigation	317
—, illustrative cases	318-324
Liver, disorders of, drug treatment, indications for	454
—, —, use and abuse of drugs in	451
— treatment of anæmias, extracts	391
— — — —, injection	393
— — — —, parenteral	393
Lumbago, treatment of	67
Lungs, abscess of, post-operative	234
—, collapse of, post-operative	233
—, —, treatment of	413
—, diseases of, use and abuse of drugs in	404
—, —, use of oxygen in	414
—, infarction of, post-operative	233
—, suppuration of, use of drugs in	410
Lupus erythematosus, gold treatment of	416
Magnesium oxide, use of, in stomach acidity	436
— trisilicate, use of, in stomach acidity	437
Malaria, splenomegaly in, treatment of	<i>abs</i> 217
Malnutrition, non-diabetic, use of insulin in	613
Mandelic acid treatment of pyelonephritis	432
Manic-depressive states, use of drugs in	509
Manipulation in convalescence	271
Mastoid operations, fever after	228
Mastoidectomy, after-treatment of	524
Medical papers, writing of	642
Medicaments, conveyance of	369
—, inunction of	369
Medication by nasal route	87
Menière's syndrome, treatment of	<i>abs</i> 786
Meningitis in pre-school child	687
— — — —, treatment of	689
—, lymphocytic, acute, in pre-school child	692
—, meningococcal, in pre-school child	688
—, suppurative, acute, in pre-school child	687
—, tuberculous, in pre-school child	681, 688
Menopause, symptoms of	57
—, treatment of	59
Menorrhagia, endocrine	47
—, etiology of	46
— in fibroids	3
Menstruation, artificial, production of by corpus luteum hormone	641
—, disorders of	44
Mental disorders, nasal route of medication in	93
— — — — of mixed origin, treatment of	506

	PAGE
Mental disorders, post-operative - - - - -	264
—, —, —, treatment of - - - - -	267
—, special symptoms of, use of drugs in - - - - -	507
—, use of drugs in - - - - -	504
Mercury inunction - - - - -	370
Metropathia, menopausal, treatment of - - - - -	54
Metrorrhagia, endocrine - - - - -	49
—, etiology of - - - - -	47
Midwifery, use and abuse of drugs in - - - - -	484
Migraine in children, vomiting in - - - - -	162
Miscarriage, repeated, treatment of - - - - -	55
Morphine, use of in midwifery - - - - -	486
Movement, passive, in convalescence - - - - -	269
Mucus, gastric, removal of - - - - -	438
Muscles, abdominal, care of during convalescence - - - - -	274
Myelitis, absent knee-jerk in - - - - -	315
— in pre-school child - - - - -	700
Myocardium, affections of, electrocardiogram in - - - - -	604
Myopathies, absent knee-jerk in - - - - -	314
 Nævi, treatment of - - - - -	 abs 215, 717
Narcotics, prescribing of - - - - -	534
Nasal route, absorption by - - - - -	90
— of medication - - - - -	87
— — — — — anatomical considerations - - - - -	89
Nembutal, use of in midwifery - - - - -	488
Nephritis, acute, use of drugs in - - - - -	428
—, chronic, use of drugs in - - - - -	430
Nephrosis, use of drugs in - - - - -	429
Nerve block in relief of pain - - - - -	66
Nervous post-operative complications - - - - -	259
— nervous symptoms at menopause - - - - -	57
Neuralgia, injection treatment of - - - - -	70
—, migrainous - - - - -	71
—, post-herpetic - - - - -	72
—, trigeminal - - - - -	70
Neurasthenia in gonorrhœa - - - - -	633
—, sedatives in - - - - -	347
—, traumatic - - - - -	196
Neuritis, diphtheritic, in pre-school child - - - - -	701
—, peripheral, in pre-school child - - - - -	700
—, —, knee-jerk in - - - - -	315
New-born, fractures of, treatment of - - - - -	abs. 329
Nitrites, use of - - - - -	385
Nitrous oxide, use of in midwifery - - - - -	490
Nose, diseases of, use and abuse of drugs in - - - - -	520, 524
—, douches for - - - - -	524
—, sprays for - - - - -	525
 Obesity, treatment of, methods of - - - - -	 95
—, —, —, —, results of - - - - -	101
Obstetrics, use and abuse of drugs in - - - - -	484
Occult blood in carcinoma of cæcum - - - - -	135
— — — — — of colon - - - - -	137
— — — — — of stomach - - - - -	131
— — — — — in chronic peptic ulcer - - - - -	143
Œdema, pulmonary, use of drugs in - - - - -	380, 414
Ointments for skin diseases - - - - -	475, 722
Opium and its alkaloids, prescribing of - - - - -	531
Opsonic index - - - - -	363
Osteomyelitis in pre-school child - - - - -	711
Otitis media, acute, treatment of - - - - -	522
Ovarian hormone therapy of menstrual disorders - - - - -	53
Ovary, chocolate cysts of, diagnosis from fibroids - - - - -	4
—, tumours of, diagnosis from fibroids - - - - -	5

	PAGE
Oxygen therapy in the home - - - - -	<i>abs</i> 655
— of acute pulmonary disease - - - - -	414
Ozena, treatment of, by heat - - - - -	<i>abs</i> 214
Pain, abdominal - - - - -	73
—, —, characters of - - - - -	78
—, —, conclusions on - - - - -	84
—, —, duration of - - - - -	82
—, —, in children, features of - - - - -	166
—, —, mechanism of, opinions on - - - - -	76
—, —, nature, severity and site of - - - - -	79
—, —, onset of - - - - -	81
—, —, somatic - - - - -	74
—, —, theories of - - - - -	73
—, —, visceral - - - - -	74
—, anginal - - - - -	562
— in lung diseases, relief of - - - - -	408
— in peptic ulcer - - - - -	141
—, individual appreciation of - - - - -	63
—, neuralgia, alleviation of by external application - - - - -	375
—, referred - - - - -	75
—, relief of - - - - -	63
—, —, by drugs - - - - -	381
—, —, by medical sedatives - - - - -	65
—, —, by nerve block at periphery - - - - -	66
—, —, by physiotherapy - - - - -	66
—, —, in biliary disorders - - - - -	<i>abs</i> 113
—, —, in gastro-intestinal disorders - - - - -	438
—, visceral - - - - -	75
Palate, soft, ulceration of, post-anæsthetic - - - - -	257
Pancreatic extracts, use of - - - - -	496
Pancreatitis, acute hæmorrhagic, two cases of, with recovery following operation - - - - -	109
Paraffin, liquid, use of, in constipation - - - - -	126
Paralysis, Erb's, treatment of - - - - -	709
—, post-anæsthetic - - - - -	262
—, pressure, post-operative - - - - -	259
—, spastic, in pre-school child - - - - -	707
Paraphimosis, gonorrhœal - - - - -	628
Parathormone, use of - - - - -	498
Parathyroid extracts, use of - - - - -	498
Parotitis, post-operative - - - - -	241
Partnership, first six months - - - - -	104
Peptic ulcer, chronic - - - - -	139
Peristaltic stimulants - - - - -	<i>abs</i> 545
Pernocton, use of in midwifery - - - - -	488
Petit mal - - - - -	309
Pharyngitis, post-anæsthetic - - - - -	257
Phimosis, gonorrhœal - - - - -	628
Phosphaturia in gonorrhœa - - - - -	633
Physical condition in relation to post-operative complications - - - - -	248
Physiotherapy in obesity - - - - -	101
— in post-operative convalescence - - - - -	269
— in relief of pain - - - - -	66
Pigments, use of - - - - -	374
Pink disease in pre-school child - - - - -	701
Pituitary extracts, use of - - - - -	501
—, —, — in midwifery - - - - -	485
Plaster bandages, preparation of - - - - -	736
— bed - - - - -	745
—, hip - - - - -	747
—, jacket - - - - -	742
— sores - - - - -	283
— splints, moulding of - - - - -	741
—, —, principles concerning - - - - -	738
— of Paris in surgical tuberculosis, technique of - - - - -	736

	PAGE
Plasters, idiosyncrasy to	481
—, use of	374, 480
Pleura, aspiration of, gas replacement in, technique of	174
—, —, —, indications and technique of	169, 172
—, irrigation of, gas replacement in, technique of	175
Pneumonia alveolar (lobar) in pre-school child	670
—, —, —, treatment of	673
—, in pre-school child	668
—, influenzal, use of drugs in	410
—, knee-jerk in	315
—, treatment of	408
—, use of drugs in	408
—, use of sedatives in	353
Poisoning, carbon-monoxide, methylene blue for	abs 656
Polio-encephalitis in pre-school child	696
Poliomyelitis acute, in pre-school child	696
—, —, —, treatment of	713
Polycythæmia vera, treatment of	402
Polymenorrhœa following childbirth	26
Post-operative cardiovascular disorders	234
— care, anæsthetic aspects	247
—, —, medical aspects of	225
—, —, surgical aspects	236
— complications, common	227
—, —, nervous and mental	259
— convalescence, physiotherapy in	269
— pulmonary complication	231
—, —, anæsthesia in relation to	255
Poultices and packs, use of	372
Practice, financial side of	206
Practice, first six months	103
PRACTITIONER, THE, new home for	551
Pre-school child, acute respiratory disorders in	668
—, —, care of	665
—, —, deformities in, diagnosis and treatment of	703
Pre-school child, diet of	727
—, —, disorders of skin in	716
—, —, inflammations of nervous system in, care and treatment of	687
—, —, tuberculosis in	676
Pregnancy and fibroids, diagnosis between	3
—, angular	3
—, hæmorrhagic	3
—, vitamin requirements in	342

PREPARATIONS, ETC.

Acrosone, 663; Antihæmolin, 336; Benerva, 120; Calcium aspirin tablets, 224; Daltonc, 663; Elixir hæmatone, 336; Energen diabetic chocolate, 792; Folinerin, 552; Iodatol, 336; Kinoo baby powder, 664; Matrilac, 120; Modastic surgical gloves, 120; Naphtolated charcoal (fraudin), 224; Navigan, 792; Ovarian hormones, 336; Prenatalac, 664; Prophyl atomiser, 336; Rheumalin, 120; Salicylysin, liniment and ointment, 224; Sangostop, 664; Soluseptasinc, 664; Streptocide, 224; Sulphonamide, 336; Testoviron, 224; Vegemucin, 120; Viteolin, 552.

Prescribing	529
Prescription writing	107
Pressure causing bed-sores	277
Probe test in cancer of cervix	15
Professional risks	317
Prontosil use of in puerperal fever	491
—, —, —, in pyelitis in children	abs 326
Proprietary preparations, use of in skin diseases	482
Prostate, hypertrophy of, treatment of, endocrine	abs 215
Protein injections in treatment of chronic peptic ulcer	149
— shock therapy of rheumatic diseases	463
— therapy in eye diseases	518
Pruritus vulvæ, treatment of	67
Psoriasis, treatment of, by colloidal manganese	abs 682
Psychological medicine, use and abuse of drugs in	502
Psychosis, organic, use of drugs in	504

	PAGE
Psyllium seeds contra-indicated in constipation	126
Puberty, hæmorrhage of, treatment of	53
Puerperal fever, treatment of by prontosil	491
Pulmonary complications, post-operative	231
Purpuras, treatment of	403
Pyelonephritis, use of drugs in	431
Pyknolepsy	309
Pyothorax	169
Pyrotherapy in rheumatic diseases	463

Quinidine sulphate, use of	383
Quinine, use of in midwifery	486

Radio-active vaseline, biological reactions of skin	770
— — —, clinical results of	772
— — —, practical applications of	771
— — —, preparation of	769
Radium therapy of cancer of cervix	17
— — — of cancer of uterus	22
— — —, surface, new technique for	769
Rashes, drug	478
Re-education in convalescence	271
Receipts, recording of	207
Rectum, carcinoma of	134
— — —, fluid administration by	237, 238
— — —, strictures of, diagnosis from carcinoma	137
Respiration, post-anæsthetic	250
Respiratory diseases, nasal route of medication in	93
— — —, sedatives in	353
— — — mechanism, effects of altitude on	204
Restlessness, post-operative	257
Restoratives, emergency prescribing of	537

REVIEWS OF BOOKS :

<i>Allergy, Recent Advances in</i> (Bray)	223
<i>Anæmias, Pathological physiology and clinical description of</i> (Castle and Minot)	116
<i>Anatomy, Buchanan's manual of</i> (Frazer)	791
<i>Anatomy, regional, Illustration of, Sections VI and VII</i> (Jamieson)	118
<i>Blood cultures and their significance</i> (Butler)	660
<i>Blood-Pressure, High</i> (Harris)	661
<i>British health resorts, 1937</i>	791
<i>Charterhouse Rheumatic Clinic, Original papers, Vol. I</i>	332
<i>Children, diseases of, Aids to the diagnosis and treatment of</i> (Allen)	223
<i>Children, sick, Diagnosis and treatment of</i> (Paterson)	335
<i>Dermatology, An introduction to</i> (Molesworth)	117
<i>Diabetes and obesity, Diet and recipes and treatment of</i> (Poulton)	788
<i>Diagnosis, Medical, Some clinical aspects</i> (Simpson)	332
<i>Diagnosis, prognosis and treatment, Principles of</i> (Hutchison)	335
<i>Diagnosis, radiological, Manual of</i> (Tchaperoff)	547
<i>Diet, British, What is wrong with?</i> (Campbell)	333
<i>Dietetics, Applied</i> (Stern)	221
<i>Dietetics for the clinician</i> (Bridges)	662
<i>Digestive tract</i> (Barclay)	222
<i>Directory, Medical, 1937</i> (Churchill)	119
<i>Doctor, Who'd be a, an autobiography</i> (Weymouth)	790
<i>Endocrinology, Recent advances in</i> (Cameron)	223
<i>Exanthemata, acute, History of the</i> (Rolleston)	789
<i>Eye, Diseases of</i> (Wolff)	787
<i>Fruits, vegetables and nuts, The nutritive value of</i> (McCance, Widdowson and Shackleton)	220
<i>General Practice, An introduction to</i> (Le Fleming)	219
<i>Hay fever</i> (Shields)	549
<i>Intestine, Absorption from the</i> (Verzar and McDougall)	221

	AGE P. 81
<i>Ionization, The practice of (Dyson)</i> - - - - -	220
<i>Kidney, pain, its causation and treatment (Jona)</i> - - - - -	219
<i>Liverpool, Medical history of from the earliest days to 1920 (Bickerton and Mackenna)</i> - - - - -	222
<i>Medical Annual, 1937</i> - - - - -	791
<i>Medical Research Council, Report of for 1935-1936</i> - - - - -	660
<i>Medicine and surgery, Contribution to chemical practice in, by members of the staff of the Southend Hospital (Edited by Hill)</i> - - - - -	549
<i>Medicine, clinical, System of (Savill)</i> - - - - -	118
<i>Medicine, Practice of (Meakins)</i> - - - - -	116
<i>Medicine, Textbook of (Conybeare)</i> - - - - -	119
<i>Medicine, Textbook of (Emerson)</i> - - - - -	548
<i>Meditatio medici: A doctor's philosophy of life (Bosanquet)</i> - - - - -	790
<i>Milk and Nutrition (National Institute for Research in Dairying)</i> - - - - -	787
<i>Milk products (Harvey and Hill)</i> - - - - -	787
<i>Mind, medicine and metaphysics: the philosophy of a physician (Brown)</i> - - - - -	220
<i>Morals, modern, History of (Hodann)</i> - - - - -	334
<i>Morphine habit and its painless treatment (Scott)</i> - - - - -	791
<i>Mothercraft (King)</i> - - - - -	791
<i>Neuralgias, Facial (Harris)</i> - - - - -	548
<i>Neuroses, Common (Ross)</i> - - - - -	662
<i>New-born baby, Management of, A guide for midwives (Moncrieff)</i> - - - - -	118
<i>Nose and throat, Diseases of (Thomson and Negus)</i> - - - - -	790
<i>Nose, throat and ear, Diseases of (Hall)</i> - - - - -	788
<i>Osteopathy, What is? (Hill and Clegg)</i> - - - - -	661
<i>Pain, Diagnostics of (Wernse)</i> - - - - -	117
<i>Pediatrics, Synopsis of (Zahorsky)</i> - - - - -	791
<i>Pharmacology, Manual of (Smart)</i> - - - - -	119
<i>Pharmacopœia, Extra, Vol. 1 (Martindale and Westcott)</i> - - - - -	549, 662
<i>Pharmacopœia for chiropodists (Le Rossigive and Holliday)</i> - - - - -	334
<i>Physiology and biochemistry, Handbook of (Halliburton and McDowall)</i> - - - - -	662
<i>Physiology, Essentials of (Bainbridge and Menzies)</i> - - - - -	223
<i>Pneumonia, Diagnosis and treatment of (Howard)</i> - - - - -	331
<i>Practice, medical, British encyclopædia of, Vol. 2 (Rolleston)</i> - - - - -	222
<i>St. Thomas's Hospital Reports, Vol. 1</i> - - - - -	334
<i>Social problem group? (Blacker)</i> - - - - -	333
<i>Squint, Practical orthoptics in the treatment of (Lyle and Jackson)</i> - - - - -	788
<i>Surgery, orthopedic, Handbook of (Shards and Raney)</i> - - - - -	789
<i>Surgery, Operations of, the abdomen, Vol. 2 (Rowlands and Turner)</i> - - - - -	223
<i>Surgery, Operative (Miles)</i> - - - - -	119
<i>Surgery, Orthopedic, Recent advances in (Burns and Ellis)</i> - - - - -	331
<i>Surgery, orthopedic, Elements of (Smith)</i> - - - - -	547
<i>Syphilis, latent, Autonomic nervous system and (Evans)</i> - - - - -	662
<i>Treatment in general practice, Vol. 2 (British Medical Association)</i> - - - - -	222
<i>Treatment, medical, Vade mecum of (Sears)</i> - - - - -	548
<i>Veneral diseases, Practical methods in diagnosis and treatment of (Lees)</i> - - - - -	335
<i>Vitamins in theory and practice (Harris)</i> - - - - -	662
<i>Weight reduction, Diet and dishes (Claxton and Burdekin)</i> - - - - -	333
<i>Rheumatic diseases, use and abuse of drugs in</i> - - - - -	458
<i>Rheumatism, gonococcal</i> - - - - -	632
—, treatment of, by histamine - - - - -	abs 659
<i>Rheumatoid arthritis, treatment of by insulin</i> - - - - -	621
<i>Ringworm of scalp, treatment of</i> - - - - -	725
<i>Risks, professional</i> - - - - -	317
<i>Rubefacients, use of</i> - - - - -	375
<i>Russell's viper venom, use of</i> - - - - -	403
<i>Salaam spasm</i> - - - - -	310
<i>Salicylates, use of in rheumatic diseases</i> - - - - -	463
—, —, in rheumatic heart disease - - - - -	377
<i>Sanocrysin treatment of tuberculosis, dosage of</i> - - - - -	415
<i>Scabies in pre-school child, treatment of</i> - - - - -	723

	PAGE
Scars, painful, treatment of	327
Schiller's test in cancer of cervix	15
Schizophrenia, use of drugs in	508
Sciatica, treatment of	67, 68, <i>abs</i> 682
Scopolamine, use of in midwifery	486
Sea-sickness, mixed types, treatment of	305
—, sympathicotonic	299
—, treatment of	297
—, —, —, preventive	300
—, —, —, remedial	303
—, vagotonic	298
Seborrhoea in children, treatment of	721
Sedatives, cerebral	347
—, choice of and dangers of	350
—, medical, for relief of pain	65
—, use and abuse of	347
—, use of, in gastro-intestinal disorders	443
—, —, —, in heart disease	379
Senna, use of, in constipation	127
Serum, administration of, in meningitis	690
— sickness	467
— therapy of acute specific fevers	465
—, —, —, uses and abuses of	364
Serums and vaccines, use and abuse of	362
—, antitoxic, dosage of	364
—, use of, general principles of	362
Sex hormones, use of	500
Shock, post-anæsthetic	252
—, surgical, treatment of	236
Shoulder, Sprengel's treatment of	709
Sinuses, nasal, absorption by	89
Skin, affections of, treatment of, by intravenous charcoal	<i>abs</i> 328
—, cleansing of, by trichlorethylene	<i>abs</i> 216
—, disorders of, in pre-school child	716
—, —, —, use and abuse of drugs in	475
—, —, —, vitamins in	<i>abs</i> 543
—, gangrene of, post-operative	<i>abs</i> 328
—, infection of, parasitic, treatment of	<i>abs</i> 112
—, —, —, treatment of	724
—, maceration of, causing bed-sores	280
—, malnutrition of, causing bed-sores	279
Skull, fractures of	189
Sodium bicarbonate, use of in liver disorders	453
—, —, —, —, stomach acidity	436
— citrate, use of in stomach acidity	436
— morrhuate, ineffective in tuberculosis	425
Spasmodics, use of in gastro-intestinal disorders	443
Sprains, treatment of	67
Sprengel's shoulder, treatment of	708
"Squatter" hints to	103
Sterility, treatment of	55, 111
Stimulants, use of, in exanthemata	474
—, —, —, —, in heart disease	379
Stitches, removal of, method of	245, 246
Stomach, acidity of, control of	435
"Stomach bottles," prescribing of	538
—, carcinoma of	129
—, —, —, —, diagnosis and symptoms of	130, 131
—, —, —, —, treatment of	132
—, dilatation of, acute, post-operative	242, 252
—, ulcer-cancer of	130
—, ulcer of, chronic	139
—, —, —, —, treatment of	144
Suprarenal extract, use of	499
Surgery in obesity	100
Sydenham's chorea in pre-school child	699

	PAGE
Sympathetic sensory conduction of pain - - - - -	64
Sympatheticotonia and sea-sickness - - - - -	299
—, treatment of - - - - -	304
Syphilis of brain, use of drugs in - - - - -	504
 Tachycardia, electrocardiogram in - - - - -	607
—, persistent, post-operative - - - - -	235
Talipes, treatment of - - - - -	705
Tetraplegia in pre-school child - - - - -	708
Throat, diseases of, use and abuse of drugs in - - - - -	520, 526
— gargles - - - - -	526
— paints - - - - -	527
—, sore, post-anæsthetic - - - - -	256
— sprays - - - - -	527
Thrombophlebitis migrans, post-operative - - - - -	229
Thrombosis, coronary, electrocardiogram in - - - - -	605
—, —, pain in, treatment of - - - - -	568
—, —, post-operative - - - - -	235
—, venous, post-operative - - - - -	229
Thyroid extract, use of - - - - -	494
— gland and heart inter-relationship of - - - - -	571
—, changes in, in iodine deficiency - - - - -	571
— treatment of rheumatic diseases - - - - -	464
Thyroidectomy, subtotal, in thyrotoxic heart disease - - - - -	575
Thyrotoxicosis, treatment of by insulin - - - - -	621
Tinnitus aurium, treatment of - - - - -	524
Toe-nail, ingrowing, conservative operation for - - - - -	abs 684
Tonsillectomy in rheumatic carditis - - - - -	598
Trauma causing bed-sores - - - - -	279
Tuberculin treatment of pulmonary tuberculosis - - - - -	411, 426
—, use of in ocular tuberculosis - - - - -	518
Tuberculosis, abdominal, in pre-school child - - - - -	680
— in pre-school child - - - - -	676
—, —, —, prophylaxis of - - - - -	683
—, latent, in pre-school child - - - - -	681, 684
—, pulmonary, quiescent, effect of operation on - - - - -	231
Tuberculosis, surgical, treatment of with plaster of paris - - - - -	736
—, —, treatment of, calcium salts - - - - -	416
—, —, —, creosote - - - - -	423
—, —, —, gold - - - - -	411
—, —, —, gold salts - - - - -	417
—, —, —, insulin - - - - -	613
—, —, —, tuberculin - - - - -	411, 427
—, —, —, vitamin - - - - -	421
—, —, use of sedatives in - - - - -	353
—, use and abuse of drugs in - - - - -	416
Twilight sleep - - - - -	487
Typhoid fever in children treatment of - - - - -	abs 544
Ulcers, acute or trophic - - - - -	277
—, decubitus, causes of - - - - -	277
—, peptic, chronic - - - - -	139
—, —, —, course and symptoms of - - - - -	140
—, —, —, differential diagnosis and physical signs of - - - - -	142
—, —, —, etiology, frequency and incidence of - - - - -	139
—, —, —, prognosis of - - - - -	150
—, —, —, treatment of - - - - -	144
—, —, —, — medical - - - - -	145
—, postural or chronic - - - - -	277
 Ultra-violet light therapy of children - - - - -	abs 330
Urethra, instrumentation of, in gonorrhœa - - - - -	625
—, stricture of, complicating gonorrhœa, treatment of - - - - -	631
—, treatment of, in gonorrhœa - - - - -	624
Urethral discharge, recurrence of, in gonorrhœa - - - - -	629

	PAGE
Urinary tract, diseases of, prescribing in	539
Urine, colour of	178
—, —, —, black	180
—, —, —, green	180
—, —, —, pink or red	179
—, odour and colour of, in health and disease	177
—, retention of, in gonorrhœa, treatment of	629
—, —, —, post-operative	240, 252
Uroerythrin, in urine	178
Urticaria in children, treatment of	722
Uterus appendages, inflammation of, diagnosis from fibroids	5
—, body of, cancer of, diagnosis of	21
—, —, —, —, treatment of, operative and radiological combined	22
—, cancer of, differential diagnosis of	6
—, —, —, mortality of	11
—, cervix of, cancer of, age incidence of	11
—, —, —, —, differential diagnosis of	17
—, —, —, —, early diagnosis of	12
—, —, —, —, investigation in	13
—, —, —, —, prevention of	20
—, —, —, —, sites of	12
—, —, —, —, speculum examination in	15
—, —, —, —, treatment of, operative, results of	18
—, —, —, —, —, radium	17
—, —, —, —, —, results	18
—, —, —, —, —, X-ray	17
—, —, —, stump of, cancer of	17
—, fibrosis of, diagnosis from fibroids	4
—, hæmorrhage of, continuous, following delivery	24
—, malignant disease of, diagnosis from fibroids	6
—, —, —, —, early diagnosis and treatment of	11
—, retroflexion of, diagnosis from fibroids	7
—, —, —, puerperal	29
 Vaccine therapy, abuses of	363
—, —, —, in rheumatic diseases	464
—, —, —, in whooping-cough	468
Vaccines and serums, use and abuse of	362
—, autogenous, use of	366
—, prophylactic	366
—, use of, general principles of	363
—, uses and abuses of	365
Vagina, bacterial infection of	42
—, discharge from, and leucorrhœa	33
—, —, —, classification of	37
—, —, —, following childbirth	27
—, —, —, treatment of	38
—, monilia infection of	42
—, prolapse of puerperal	30
—, secretion of, at different ages	34
—, —, —, normal	33
—, <i>Trichomonas vaginalis</i> infection of	41
Vaginitis, etiology and treatment of	40
Vagotonia and sea-sickness	299
—, treatment of	303
Vaseline, radio-active	769
Vegetable bitters, use of	441
Viosterol treatment of tuberculosis	423
Vitamin A, use of	343
—, B, complex	344
—, —, use of	344
—, C, use of	345
—, D, use of	345
—, E, use of	346

	PAGE
Vitamin therapy of tuberculosis	421
Vitamins, administration of scientific indications for	342
— in diet of pre-school child	729
—, over-dosage of	340
—, therapeutic uses of	342
—, use and abuse of	340
Vomiting, anæsthetic	253
— following X-ray treatment, pentobarbital sodium in	abs 657
— in children	161
—, post-operative, prevention of	254
Vulvovaginitis	41
Warts complicating gonorrhœa	629
Water-brash, significance of	142
Wax in ear, removal of	521
"Whites" in relation to cancer	13
Wounds, treatment of by ichthyol	abs 657
Xeroderma, treatment of	719
X-ray diagnosis of carcinoma of stomach	131
— of chronic peptic ulcer	142
— therapy, deep, of cancer of cervix	17
—, —, — uterus	22
— of fibroids	10

